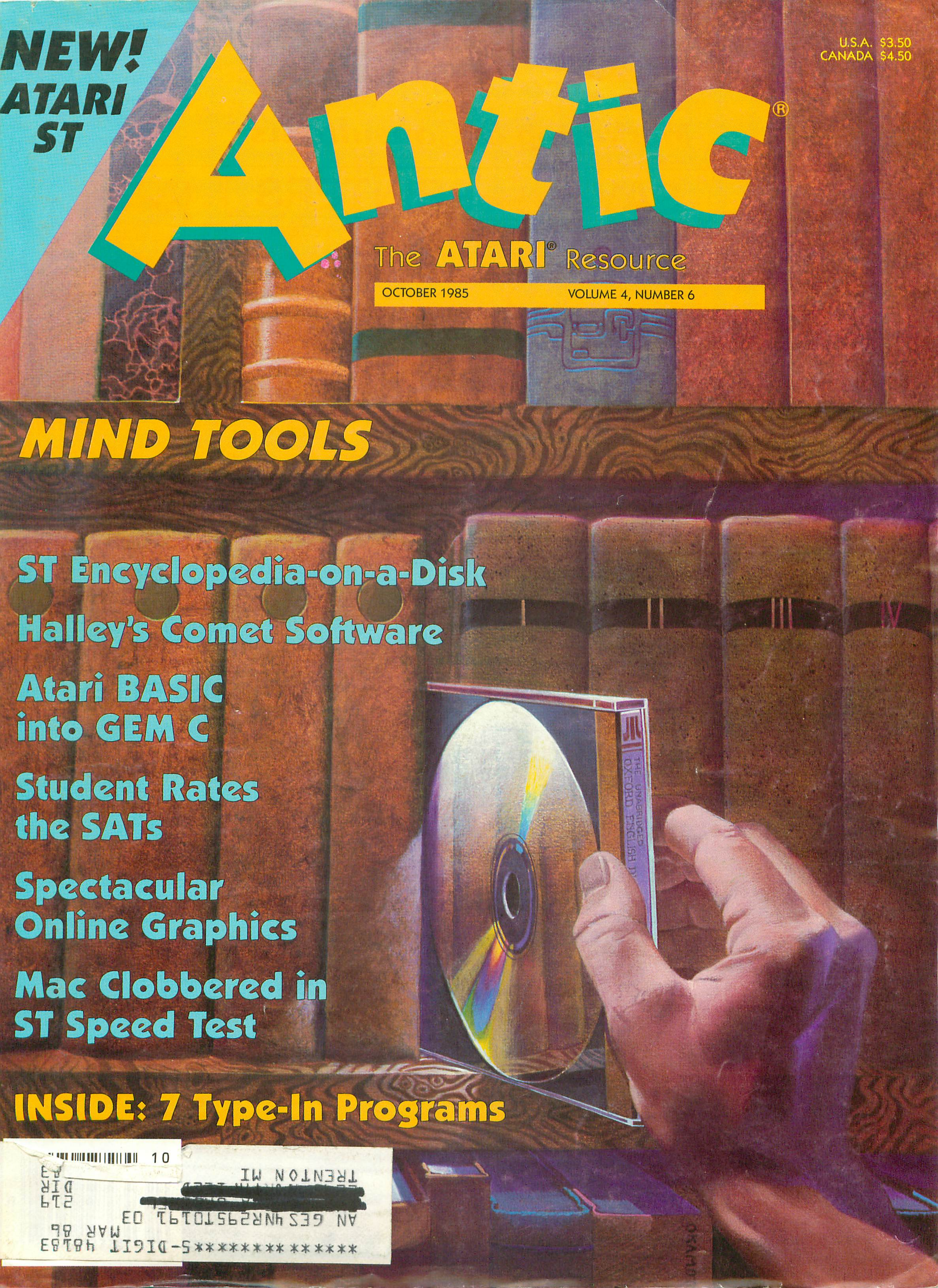
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OCTOBER 1985 VOLUME 4, NUMBER 6



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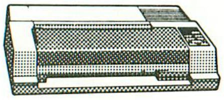
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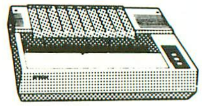
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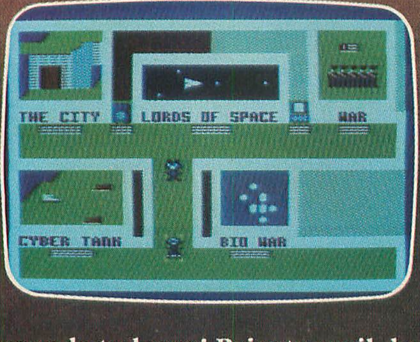


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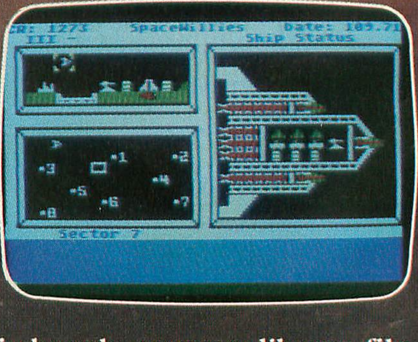
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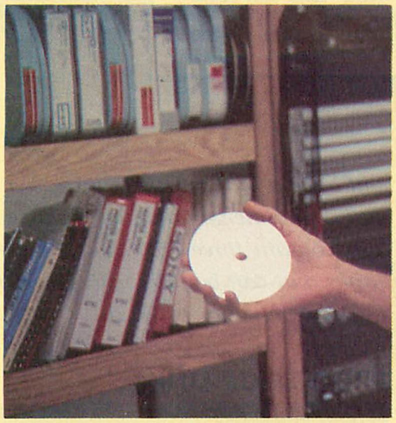
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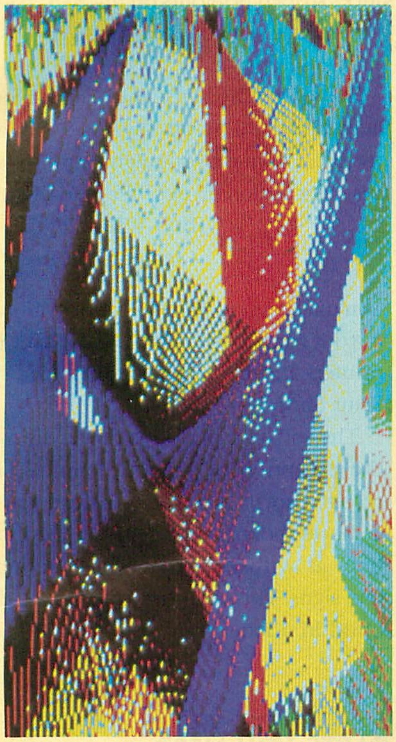
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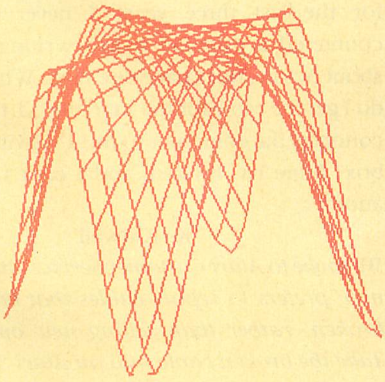
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i/o board

1027 INK ROLLERS

I'm having a very hard time finding the printer ink rollers for my Atari 1027 printer. No retail shops here in the Florida Panhandle carry these. Could you help me?

Bruce Daniel
Niceville, FL

The friendly folks at Atari Customer Service assured us that they have a plentiful supply of these, although they are not common around the country. They can be ordered directly from Customer Service for $3.98 each.
Atari Customer Service
1196 Borregas Avenue
Sunnyvale, CA 94086

kyan QUERY

I've heard of a kyan Pascal package for $69.95. Can you tell me something about it before I invest?

Robert Stadler

Look for a review of kyan Pascal in these pages next month.—ANTIC ED

130XE TIPS

Has anybody noticed that on a 130XE, one does not need to press [SHIFT] along with [CAPS] to enter upper-case letter mode? Also, for some reason typing RUN in inverse video works (but not RUN "D:).

Frank Imburgio
Setauket, NY

ACCURATE ATARIWRITER

Can you give me some information on a spelling checker program that will work with AtariWriter?

Tony M. Han
Oak Grove, MO

The Antic Arcade Catalog has one program, Spell Magic, which will work with AtariWriter. Also, this year Atari will be bringing out an improved version of AtariWriter called AtariWriter Plus. This will have a built-in spelling checker as well a mailmerge function. And it will also contain three 15K switchable file banks that can be fully utilized on the 130XE computer.—ANTIC ED

PRINT SHOP LINKS

I have found Print Shop to be a superb program except for one small item. It produces striped printouts on my BMC BX-80 when I use it with their BMC or Epson printer setups.

However, when I use the Mannesmann Tally Spirit 80 setup my printouts are perfect. I thought you might want to pass this information on to other Atari owners.

Bob Whipple
Clementon, NJ

You may want to pass this information on to your readers who own Star Gemini 10X printers and are contemplating acquiring Print Shop.

The software performs flawlessly, with the exception of printing banners. The result is not as described. Instead you get a checkerboard pattern, rather than solid lines as with greeting cards, letterheads and signs. This was confirmed by Broderbund in a letter they sent me.

Hisham M. Saaid
Frankfort, KY

PARTS YOU NEED

I have enjoyed your magazine very much for the last three years. I never encountered a problem worth writing in about before, but I have one now. Where do I get the cable for the Atari 600XL that connects the computer to the TV switchbox? Mine has broken, and I can't find another.

K. Kidwell

We spoke to Atari Customer Service. Atari now prefers to repair cables that have broken, rather than selling new ones. Take the broken cable into an Atari Service Center. Or send it to Atari Customer Service, they will fix it for you and return it COD.

antic online

SPINNAKER SUPPORT

Spinnaker Software would like all readers of **Antic** Magazine to know that it intends to fully support the new Atari ST computers. Spinnaker was the first major publisher to announce support for the ST, and we intend to support the machine across each of our brands: Spinnaker, Fisher-Price, Telarium, Windham Classics and Better Working.

It takes time to convert software to a new computer, especially when it has such wonderful new features. We will have the first of our products available in September, and should have 10 different titles available for Christmas.

Spinnaker has been a long supporter of Atari Computer products, and we intend to remain so in the future.

William H. Bowman
Chairman
Spinnaker Software

Type GO ANTIC when you log onto **CompuServe** in September. On ANTIC ONLINE you'll always find the latest news about the bonanza of sophisticated software coming soon for Atari ST computers.

WUN BOARD NEWS

Members of Atari users groups affiliated with the Worldwide Users Network will want to see the coverage of the first WUN Board of Directors Meeting. The WUN grassroots movement should have some exciting developments for members this autumn.

Featured this month on ANTIC ONLINE is the complete eight-lesson course in Assembly Language by famed game designer Chris Crawford. You'll find all eight lessons in the Worldwide Users Network pages.

And don't forget that a complete Antic Arcade Catalog customer service system is now available on ANTIC ONLINE. Follow the Antic Central Menu Prompts to upload your queries for quick email response.

SIGNING UP

If you're not a CompuServe subscriber yet, see your local computer dealer or phone (800) 848-8199 for information about signing up. Ohio residents phone (614) 457-0802. There is no extra charge for accessing ANTIC ONLINE.

Now ANTIC ONLINE (and SIG*Atari) are also available on the **Delphi** service at a saving of $6 per hour for 1200 baud access. Phone (800) 544-4005 for information about signing up with Delphi. Massachusetts residents phone (617) 491-3393.

help!

ATARI 'TOONS

The 22nd data character in line 1090 of Listing 2 in Atari 'Toons (August, 1985) is an A. The A got smudged during final printing. Because this will undoubtedly throw off many contestants, the Atari 'Toons contest deadline is being extending by one month.

Also, 'Toons will only load standard size character sets. To fix this, change **NUMBER=1024**, in line 1140 to, **NUMBER=2050**. And change line 1150 to: **1150 GOTO 1170**.

November 1, 1985 is the new deadline for entries to arrive at **Antic**. First prize in the Atari 'Toons contest is a 1200 baud modem.

STAR VENTURE

Our July, 1985 bonus game, Star Venture, has difficulty restarting. Change line 380 to the following:

```
380 IF PEEK(53279)=6 TH
EN SOUND 0,0,0,0:GOTO 8
0
```

MUSICIAN

If you're having problems with tempo changes in Musician (**Antic**, June, 1985) remove line 1720 and add the following line:

```
1715 IF A=14 THEN TEMPO
=-0.25:GOTO 1700
1720 REM REMOVE T
HIS LINE
```

TYPO II MATH WIZ

This issue, in the Software Library pages, you'll find the TYPO II line codes for Math Wizard, a Matthew Ratcliff educational game that **Antic** published in April, 1984.

The July, 1985 **Antic** also provided TYPO II correction codes—for all three popular 1984 games by J.D. Casten plus Adventure Island (November, 1984).

CUSTOM PRINT

When you use a redefined character set, Custom Print (March, 1985) has trouble printing certain characters—such as !, #, $, and so on. To correct this, change line 5 to:

```
5 CS=PEEK(106)-8:
POKE 106,CS-1:GRA
PHICS 0:DIM CST$(
20):CST$=""
```



Customs Office

GAMES COMPUTERS PLAY

Superb color graphics online

by ERIC CLAUSEN



CyberTank Combat



Cybership Design

You log onto **Games Computers Play** and suddenly you're in a wonderland of boldly geometric color graphics, with perspectives that come at you from startling angles.

The whole scene could have been designed by M.C. Escher. Or you might be in a vast game of **Realm Of Impossibility**, the Electronic Arts update of the earlier classic **Zombies**. Except you're online and your Atari's playmate is a powerful 300-megabyte minicomputer based in York, Pennsylvania.

Games Computers Play (GCP) is a unique new commercial online service that features state-of-the-art color graphics and easy icon control by joystick. GCP also offers exciting interactive games, real-time conferencing, electronic mail and public domain downloads.

Online since January 1985, GCP is just for Atari computers with 48K memory, disk drive and modem. Currently supported are Hayes SmartModems and compatibles, plus the Atari 1030 and 835 modems. MPP support may come in the future.

GCP costs only $6 an hour from 6 pm to 7 am and throughout the weekend. Weekday "prime time" is $15 an hour. A one-time $30 signup fee gives you five free hours online, so in effect it costs you nothing extra.

There's no extra charge for 1200 baud, in fact it's highly recommended because of the large amount of data needing to be transferred for updating the graphics screens.

GCP subscribers get a total of three disks, which support the online graphics cues for different areas of the system. This approach is one of those brilliantly simple ideas that you wonder why nobody ever thought of before.

User friendliness is the hallmark of GCP. Keyboard commands are simple and kept down to a minimum. You'll control most of what you do online simply by moving your "droid" icon with a joystick.

Even the process of logging on is totally automated if your modem supports autodialing. It's very simple to configure the GCP boot disk for your modem, and then you're ready to go online.

ENTERING GAMEWORLD

As you log on, an ornate set of doors bearing the GCP logo slides open. You are in the Customs Office where you

Continue on page 10

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SUPER STUD POKER
by Walt Huber

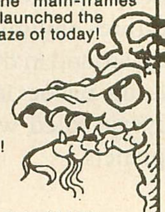
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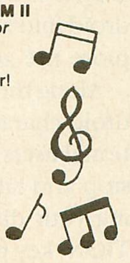
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GAMES
contined from page 8

will be asked to present your username and password. As you pass through customs, you can pick out one of the 15 styles of droid bodies from Wardrobe. Your joystick-controlled droid icon now becomes your onscreen character for exploring and interacting with the world of GCP.

Step past the customs desk to a door marked City and press the joystick button. You are prompted to insert your City Disk. The disk drive whirs for a moment and your droid is transported to the magical realm where much of the GCP action takes place.

As you look around the main plaza you see stairs and corridors leading to rooms labeled Post Office, Social Hall, Games and Office. You can guide your droid into any of these rooms and explore the activities.

Along the way, you may meet other droid characters who represent additional users online with you. You can stop and talk to them simply by typing your dialogue. Pressing the [OPTION] key puts you in Whisper Mode that can only be heard by selected droids. Or you can invite a group into a Social Hall room for an impromptu conference.

The Social Hall is filled with a series of rooms numbered like apartments for easy location. If you meet friends in the corridor you can ask them to meet you in Room 120, for example. Once you're at this actual location, you have the option of closing the room door to exclude other users and carry on a private conversation. Or if you'd like to be more sociable, you can leave the door open and invite everyone in.

CYBERTANK WARRIORS

You may decide after awhile in the Social Hall to engage in a little online mayhem in the Game room. You insert your Game Disk and invite some of your more fearless friends to join you in a friendly (ha, ha) game of CyberTank.

This little diversion allows you to design your own tank, complete with customized weaponry, and do battle with multiple players in real-time on a colorful scrolling screen. Watch out for the more experienced players who can shoot the wings off a fly from miles away. Actually, they'll help out novices like you as long as you don't get too uppity!

BioWar is a single/multiple player game that's a strategy version of the computer classic Life. You position cell colonies so that you can trap or destroy an opponent.

GCP has more games under construction, SpaceLanes and War. These should be available to subscribers by the time you read this.

Details on War have yet to be released. But SpaceLanes promises to be quite an epic. It features unlimited online players cruising around in their starships and wreaking havoc in a huge electronic universe filled with unlimited realistic planets.

GCP POST OFFICE

The Post Office in GCP represents a masterpiece of software design. Virtually any type of mailing can be sent to any individual user or group of users. Public domain program uploads and downloads are also handled within the post office.

As of this writing, more than 120 public domain downloads were online. You are encouraged to upload any interesting public domain software you may have. A custom file transfer protocol virtually guarantees error free transmission.

The Office is where you frequently may find the systems operators of GCP. If they're online you might wander in to say hello or ask a few questions, The sysops are very helpful to new users. Of course, you can always leave mail if no one is at work.

ICON POWER

Scattered through all areas and rooms of the GCP world, you'll find icons representing telephones and computer terminals. From the telephones you can contact other online users by typing their usernames, even if you can't see their droids.

The terminals support numerous functions. From a terminal you can type various commands that eliminate the need to walk from room to room. GOTO instantly transports you to a new location, WHO tells you who's on the system and where they are, CHECK MAIL does just that. And there are several other time saving commands.

GCP has recently updated the terminal software to Version 1.02, which speeds up system access. Future updates are to support additional games and faster access times.

The sysops of GCP have ambitious plans for their system. Eventually they'd like to expand to convenience services such as at-home banking and at-home shopping.

Games Computers Play is a fascinating interactive upgrade to the usual online fare. Give GCP a try and you could well be hooked too!

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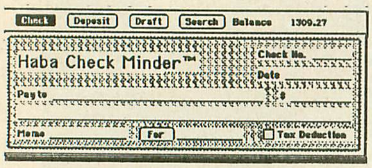
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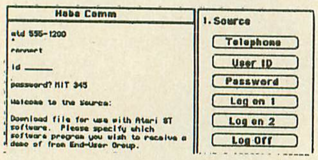
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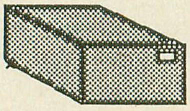


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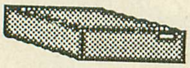
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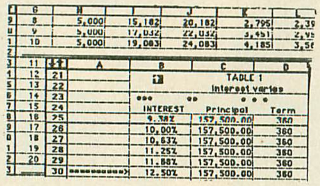


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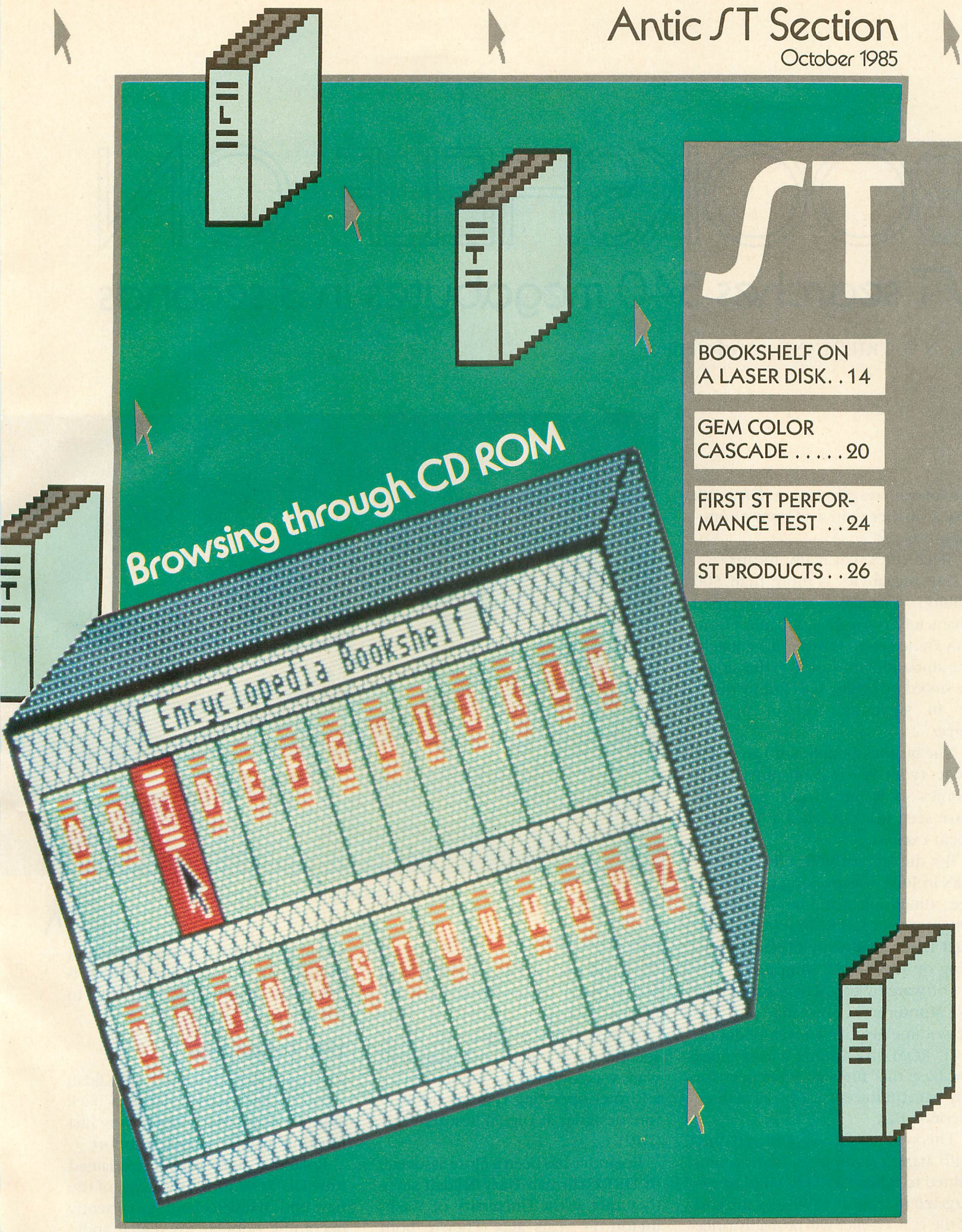
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ST

Browsing through CD ROM



BOOKSHELF ON

ST searches 540 megabytes in 3 seconds

by NAT FRIEDLAND, **Antic** Editor

540 megabytes of memory. On a disk that's smaller than a 45 rpm phonograph record.

What does that really mean?

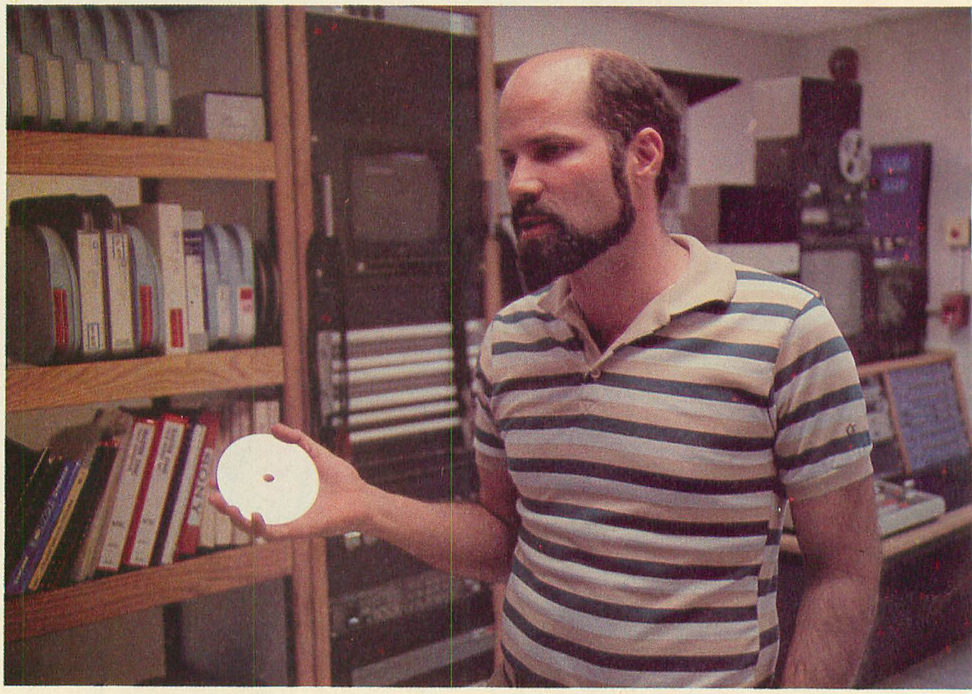
540 megabytes is more than 500 million characters—enough typed characters to stretch 1,000 miles from San Francisco to Denver. It's equal to the amount of information that could be stored on 6,000 Atari floppy disks, or in 50 cubic feet of printed pages. . .

The businesspeople who go to the huge twice-yearly Consumer Electronics Shows are cynical pros who have seen it all. It takes a lot to get them excited.

But the Atari exhibit at the Chicago CES in June was packing them in to see something genuinely new—the 540 megabyte CD ROM system (Compact Disk, Read Only Memory) running on the 520ST computer.

Software by the Activenture Corp. of Monterey, California put the 26-volume Grolier Encyclopedia on a CD ROM disk—along with a smart database that finds all references for any word in the encyclopedia in three seconds flat.

This system will be premiered only with Atari ST computers. Atari is committed to release a CD ROM player—targeted to retail at $599—by the end of the year. Grolier will probably price the CD ROM encyclopedia disk at around $150-200.



Tom Rolander holding the CD ROM disk

DRI BONUS

CD ROM on the ST computers is in fact a major bonus from the Atari-Digital Research connection. The company that developed the three-second encyclopedia-indexing software was founded by Tom Rolander, a former operating systems architecture designer at Digital Research Inc. (DRI).

Rolander has been a close associate of DRI chairman Gary Kildall since they met at the University of Washington 14 years ago. They're both fanatical pilots and share ownership of a small armada of airplanes, including aerobatic and ultra-light models. As an individual, Kildall is listed as technical consultant to Activenture.

THE JACKINDISK

In January 1985, Rolander and Kildall went to see Atari Chairman Jack Tramiel. It was Activenture's very first meeting to raise outside support.

Rolander and Kildall explained how CD ROM took advantage of the new optical disk technology currently becoming popular for digital audio recordings. Read-only optical disks were already being inexpensively

LASER DISK



Video Editing Bank



VAX 11/750

mass produced and could be adapted to hold vast amounts of *any kind* of computer-readable information.

They told Tramiel that the Bible, Shakespeare's complete works, the total card catalog of the Library of Congress, entire medical and law databases, computer programs and video images too—virtually any type of data could be digitized, stored on optical disks, and referenced almost instantly by a personal computer.

Only two CD ROM disks would be needed to store every phone listing in the USA for speedy updating.

A single CD could hold a world atlas, a complete directory of international airline schedules, and detailed information about major destinations. It would be like having an expert travel agent on a disk.

Interactive CD ROM cookbooks could be programmed to recommend recipes based on your input of the ingredients available in your refrigerator or on sale at weekly specials.

After 15 minutes of this, Tramiel looked off into space and said quietly, "This would give people a good reason to buy my new computer, wouldn't it?

As a result of that meeting, not only will the Atari ST will be first microcomputer to have CD ROM capability—Atari will have exclusive rights to the Activenture process for some time after release.

EXCLUSIVE INTERVIEW

In the person of Technical Editor Jack Powell and myself, **Antic** was the first

continued on next page

WHAT'S A CD?

CD stands for compact disk, which has become the commonly used term for a digitally recorded audio disk that is read by a beam of laser light.

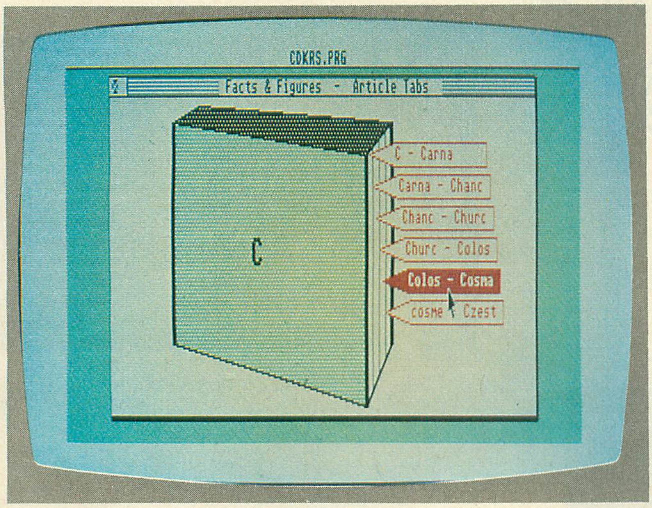
This new digital recording technology has great potential for unprecedentedly fast, acessible, high-density data storage.

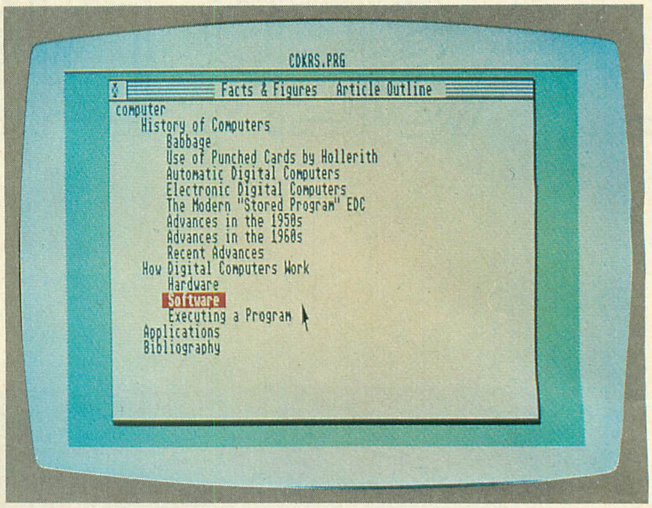
Digital audio has become popular very quickly because it reproduces original sound with remarkable accuracy and dynamic range. Compact disks also have virtually no added background noise or distortion. No stylus ever touches a CD to wear it out, there is no tape hiss.

Digital music recording involves sampling the audio signal thousands of times a second. These samples are translated into binary code—the zeroes and ones that make up the bytes in your computer memory. A laser beam cuts the binary code onto a master disk in microscopic "pits."

Compact disks are then pressed from the master and coated with a thin layer of aluminum. They also have a protective layer of plastic that makes the CD extremely hard to damage. A CD player reads the coded pits by using a laser head and a mirror that focuses the light onto an optical sensor.

- BROWSE MODE -





publication to interview Tom Rolander at Activenture after his triumphant return from CES. The company is located in a brand-new high-tech office complex. It's alongside the Monterey Airport so that Rolander can clear his mind with flight breaks if he gets bogged down in a programming problem.

Enthusiastic and personable, Rolander started **Antic's** visit by showing off the latest version of **Facts and Figures** on an Atari 520ST. This is the program that comes with the encyclopedia disk and controls all the CD ROM operations.

It should be emphasized that the software we saw here and at CES was not merely a demonstration fragment. The program was fully operational, with apparently only minor debugging left.

Rolander called up the Encyclopedia Bookshelf screen and showed us the Browse Mode, which is like flipping through multiple books and pages with unprecedented ease and convenience. Using the mouse, you can swiftly move forward and backward, choose any individual volumes, sections and entries.

It's a lot handier than shelving and reshelving five cubic feet of encyclopedia books. And any of the text displayed on screen is easily copied to your printer or disk.

We then switched to Search Mode, the real selling point of CD ROM databases. Rolander invited us to ask for any article or reference. We requested "Transylvania." In a few seconds we had a long list of references and were clicking our way alphabetically through articles about Balkan history and geography, the infamous Elizabeth Bathory and good old Vlad Dracula.

The program can also do relational searches. It will seek out as many multiple topics as can be fit into some 500 characters. And you can choose whether you want only those multiple topics mentioned in the same sentence, same paragraph, or simply any article containing the multiple topics.

We asked for a multi-topic search on: German, Submarine. A full screen of references popped up in a flash. As we scanned the alphabetized headings, we were surprised to see an entry for "Hemingway, Ernest."

Unable to resist taking a look, we immediately clicked to Hemingway's biography article and discovered that the great novelist considered himself to be a volunteer anti-submarine watcher during WWII when he lived in Cuba. This is typical of the kind of unexpected information that Activenture's CD ROM software consistently turns up.

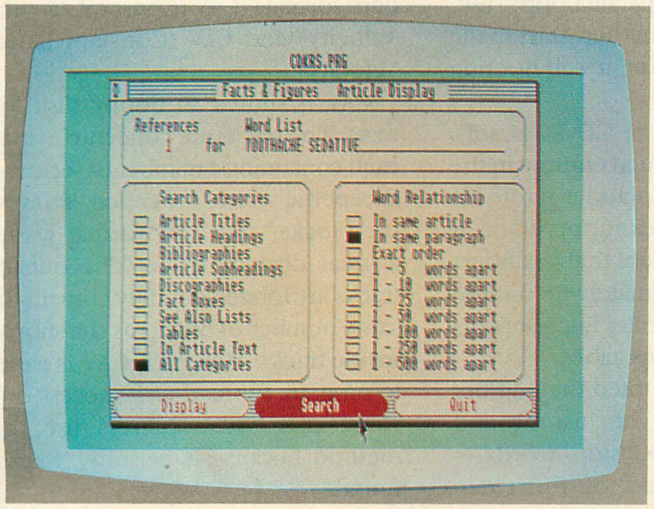
For a search on pioneer psychologist Carl Jung, Rolander selected the Bibliography choice from the search window menu. We instantly saw a screen full of book references, arranged by topics and subtopics. Here is another valuable research tool provided by the Activenture CD ROM software.

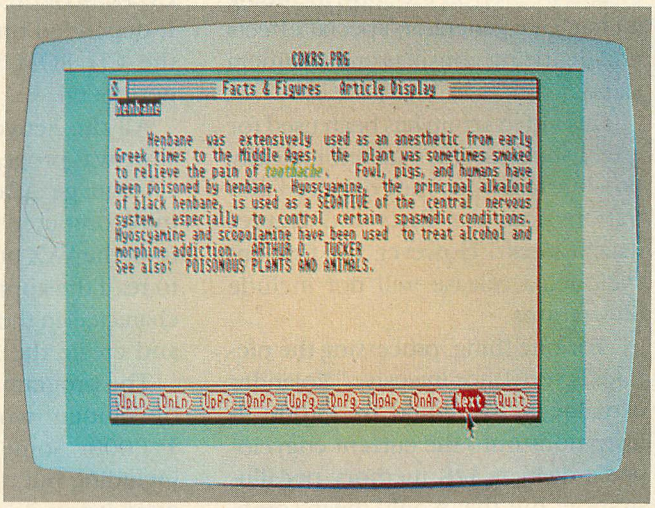
We asked Rolander if the software would support "wild card" searches. He said that it could be done, but he was still trying to decide on a wild card system that would be easier for non-programmers than the asterisks and question marks commonly used in computer files for indicating the search's wild characters.

The hardware set-up doing all this was a standard 520ST cabled to a Philips CM100 CD ROM player via a prototype controller box. When the product is released, the controller interface circuitry will be reduced to a board inside the disk player.

Atari plans to contract with one of the major CD ROM manufacturers to make a disk player for sale under the Atari name. At this writing, Philips was the front-runner for the deal. The

- SEARCH MODE -





disk mastering for Facts and Figures has been done by Philips in Holland. The first CD ROM mastering facility in North America was due to be opened by 3M this fall.

HOW COMPATIBLE?

We started by bringing up our questions about CD hardware. How different is CD ROM from standard digital audio disk technology? Could you use CD ROM on any compact disk player?

"No, it's not 100% compatible with digital audio. But the idea is to keep down CD ROM costs by using as much as possible of the CD audio technology," said Rolander. "And there is a universal CD ROM standard that has been accepted by Philips, Sony, Hitachi and all the other major manufacturers involved in the field. So there won't be any problems with competing formats."

Similarities between CD ROM and CD audio include the same 4.75-inch disk size, with identical mastering and duplicating processes. This keeps expenses low. It costs no more than $4,000 to make a master disk for pressing. The cost for pressing 1,000 disks is $4 apiece.

All CD players share the same principles of laser optics, the same motor and drive specifications. However, CD ROM requires greater precision in mechanically positioning the laser head and mirror.

Also, CD ROM needs a higher degree of error correction accuracy. It uses 10 to the minus 12th power—meaning you might get a typographical error once in a trillion times. This is accomplished by adding 288 bytes of error correction code onto every data "block" of 2,048 bytes. An unformatted CD ROM disk could actually store 600 megabytes.

"CD ROM needs these more precise tolerances because you cannot have the two-or-three bit error factor that's acceptable for compact disk audio reproduction," said Rolander. Accordingly, he wouldn't be surprised if top-of-the-line CD ROM players also include audio disk capability in the near future.

WHAT'S ON TAPE

"Any text that's stored on magnetic tape can be machine read and automatically indexed by our software," said Rolander. This immediately made us ask how much reference material was now available on magnetic tape.

His answer was that just about all printed matter of any substance that has been published within the past five years could be found on tape. That's because the largest state-of-the-art typesetting machines, such as the Compugraphic 8600 and the top-line Mergenthaler model, normally keep the text data on electronic tape.

"Also there are the huge libraries of information already processed electronically for online databases," Rolander added. "A surprising amount of this material is in public domain, often because it has been prepared by the government."

Rolander predicts that CD ROM will soon replace microfiche film storage of documents. Activenture has already been contacted by a U.S. intelligence agency about the possibility of converting vast libraries of raw information into CD ROM databases.

CD ROM SOFTWARE

To get a better idea of how Activenture's software is set up to access massive amounts of data so rapidly, Rolander took us into Activenture's development room.

We walked up two stairs onto the raised floor of an air-conditioned computer center and saw an array of state-of-the-art computer hardware. The heart of the system was a VAX 11/750 super-minicomputer with 8

continued on next page

megabytes of main memory and 1500 megabyte disk drives.

Across the aisle from the VAX was the video equipment, featuring a Sony professional broadcasting one-inch tape deck. A complete video editing system worked off the Sony, including a character generator, special effects and digitizing consoles and a camera stand.

This video set-up has been used for establishing that it's technologically possible to incorporate digitized illustrations into the Facts and Figures database text. However, the first encyclopedia release will not include illustrations.

"For one thing, processing the pictures is very labor-intensive," Rolander explained. "We could fit 13,000 illustrations onto the current encyclopedia disk, at 32K memory per illustration. But that would mean somebody has to place 13,000 pictures on the camera stand and operate the recording controls each time."

But that wasn't all. "Up to now, the encyclopedia companies normally own only a small percentage of the illustrations they print. The rest are leased from archives for one-time use. Activenture does not presently have the resources to negotiate rights for thousands of pictures. However, I'm sure it won't be long before fully illustrated CD ROM databases are marketed."

Rolander sees Activenture as an "optical typesetter." Paid by royalty fees, Activenture offers the service of creating a fast, interactive index for existing reference material and databases. When Rolander isn't hurrying to finalize his software in time for Atari's September deadline, he's flying East to meet with traditional publishers and sew up more CD ROM rights.

HOW IT'S DONE

The CD ROM disk has four different sections. First is the raw data—which is nothing more than all of the encyclopedia, from A to Z. Then comes the index, or table, which contains pointers to all unique words in the encyclopedia. Next is the directory, which is similar to the file management sectors of a floppy disk. It tells the program where to find a file on the disk.

Finally, there is the Facts and Figures software, which loads into the computer and runs the show. At this writing, Rolander was uncertain whether this section would be on the CD ROM or on a separate floppy disk. It depended on whether Atari made the CD ROM Player a self-booting peripheral.

All the Activenture CD ROM software was programmed entirely in the C language. After Rolander wrote his minicomputer indexing program, it took the VAX no more than six hours to read the approximately 58 million characters in the Grolier Encyclopedia and create the index table.

The program counted the number of unique words at just around 141,000. Some 30 "stop words"—including but, a, and, of, the, etc.—were ignored in the index.

At the same time, the unique words were also alphabetized and every one of their locations in the encyclopedia was mapped. One reason for the lightning speed of the Facts and Figures software is that it searches references in the index, not in the encyclopedia.

Interestingly, the fully mapped index takes up 50 megabytes, almost as long as the 58 megabytes of the encyclopedia itself. However, the entire encyclopedia and index only require one-fifth of a standard compact disk!

The encyclopedia text files must be usable with video monitors that have different resolution formats. So the software formats the text in real time as it is going into display.

"To keep the program moving fast, it calls up very large buffers," said Rolander. "In fact, it will use whatever free memory is available." The storage buffer requires a minimum of 64K, and the Facts and Figures software will also need its own 64K of RAM.

Transfer rate of the CD ROM is 150 kilobytes per second. An important design element of the ST, to speed this huge data transfer, is the DMA (Direct Memory Access) chip. And it's no accident the ST has this capability. Rolander and Atari ST hardware designer, Shiraz Shivji, worked closely together, once it was decided the ST would have CD ROM as a peripheral.

CD FILE FORMAT

The format of a standard floppy disk consists of tracks in concentric rings, each consisting of a number of sectors. Optical laser disks have two standard formats: CAV (Constant Angular Velocity) and CLV (Constant Linear Velocity).

CAV is similar to floppy disk formats. The tracks are concentric rings, each containing a number of sectors—except the sectors are called "frames" or "blocks." The CAV format wastes a great deal of space. The outside tracks are longer, but they contain the same number of blocks as the shorter inside tracks. However, CAV is easier to program for read-write access, and some laser video players use this method because it permits "freeze-frame."

CLV is a spiral format, much like a phonograph record. All the blocks in CLV are equidistant along one long spiral. So there are three times as many blocks per track at the outer edge as there are towards the center. The CD ROM's 540 megabytes in CLV format are divided into 270,000 blocks, with 2,048 bytes in each block. CLV is the format of CD audio and some video players. Rolander chose the CLV format for his CD ROM system because it permits far more storage.

AND THE FUTURE

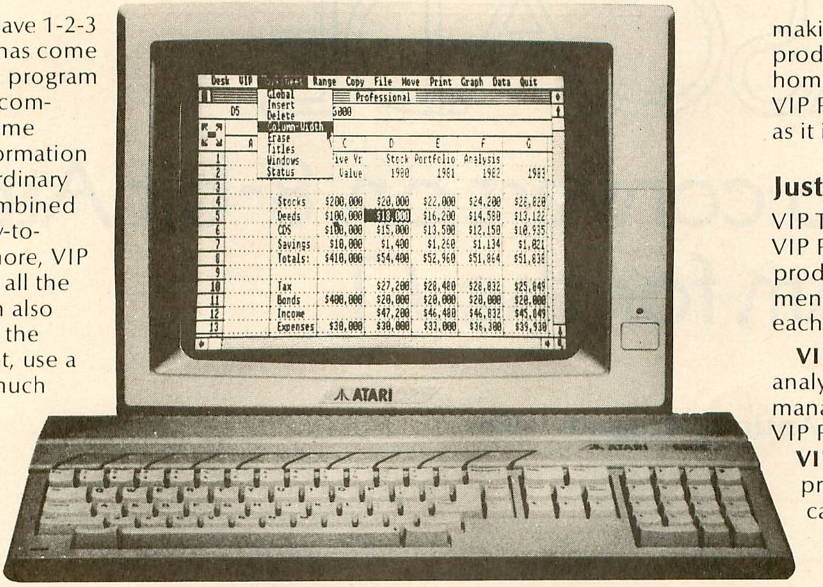
Personally we can't wait until something like the microfilm library of the "New York Times" becomes available on CD ROM so that we can browse among odd and obscure facts to our heart's content.

At the same time, we have told our typesetter (the same one since **Antic** began) never to erase any of the magazine's floppy disk files from now on. It would not be a bad idea to bring out a CD ROM disk containing every issue of **Antic**. All topics and all listings ever printed in the magazine would be instantly accessible via the CD ROM database.

And while we are at it, we might as well include every program in the **Antic** public domain library on the same disk . . .

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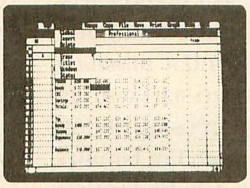
Not Just 1-2-3 in Mouse Clothing

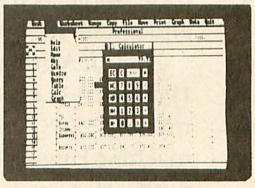
VIP Professional is totally faithful to the 1-2-3 standard. In fact, you can use "1-2-3" files created with Professional with 1-2-3 itself, or with versions of Professional on the Apple //, the Macintosh, the Commodore Amiga, IBM's, even UNIX computers. But like the ST itself, Professional also has the spirit of a daring maverick. Just as the ST outstrips the power and performance of the business computers, VIP Professional meets and out-features Lotus. Compare for yourself:

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123 Database	Yes	Yes
123 Macros	Yes	Yes
123 Files	Yes	Yes
Enhanced Graphs	Yes	No
Uses mouse	Yes	No
Drop-Down Menus	Yes	No
Icons	Yes	No
GEM interface	Yes	No
Multiple windows	Yes	No
Available on ST	Yes	No
Easy to use	Yes	No
Affordable	Yes	No

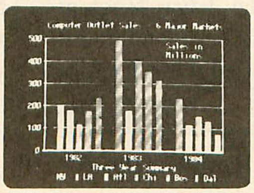
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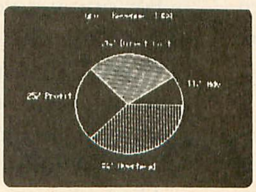
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GEM COLOR CASCADE

How to convert an 8-bit Atari program for the ST

by PATRICK BASS, **Antic** ST Program Editor

In May, 1985 I wrote a letter to the Editors of **Antic** asking if I could perhaps write an article or three for them. I mentioned that I had been a game designer/programmer for the old Atari during its heyday, and that later I programmed games for two Silicon Valley start-up companies that didn't quite "start up."

So one Thursday when I'd just gotten home from being told I was overqualified to deliver pizzas, my father told me **Antic** phoned and wanted me to come up to San Francisco and see the editors. The next morning I hopped onto my Yamaha 250 motorcycle and hit the freeway. Shortly before noon, **Antic** sat me down at a 520ST and wouldn't let me leave.

I was in hog heaven when **Antic** hired me to learn how to program their development ST. I had already decided to buy a 520ST when it became available, my only problem was figuring out how to afford one.

The pile of highly technical documentation that came with **Antic's** 520ST was almost three feet high. I took home as much as I could carry and spent the weekend reading it.

Back at **Antic** on Monday morning I confidently expected to start writing my first 520ST program using 68000 machine language, which I'm familiar with. However, the ST had other ideas.

For one whole day I was stuck at one seemingly innocent statement (.ORG or Originate) that told the computer where to start putting my program into memory. The 520ST absolutely would not get past this.

After what seemed like a couple of eternities I finally figured out that I was mistakenly assuming the 520ST acts like a microcomputer. In fact it acts much more like a minicomputer.

The ST operating system is essentially Digital Research's CP/M 68K, which is a multi-tasking system that can run more than one program at the same time. If two or more programs tried to occupy the same memory address at the same time, the computer would fail.

Therefore every application program written for the ST must be completely relocatable, able to run from any address. This is not really so strange. Any interpreted BASIC program on any computer is completely relocatable, it's constantly being shifted up and down in memory as you add or delete lines to your program.

COLOR SINEWAVE

It took another two weeks of solving more mysteries like "The Riddle of the Crashing .ORG Statement" before I was actually ready to get a program up and running on the 520ST. . .

I had never programmed in C before I sat down at the ST. And I was

happy to discover it's possible to write programs in C that look very much like BASIC. To demonstrate this, I'll explain how I wrote a program that does the same thing in C on a 520ST and in BASIC on any 8-bit Atari computer.

A simple program that I've used many times creates an impressive graphic display. It plots a sine wave from left to right and a cosine wave from right to left. Then each time it plots a pair of sine and cosine dots, it draws a line between them. The result is a pattern of lines that cascades differently across the screen each time.



BASIC COLOR SINE

It's safe to assume that more **Antic** readers can program in BASIC than in C. So let's get started by examining the BASIC program for 8-bit Ataris line by line.

Line 100 opens a channel to the keyboard and line 110 sets the X, Y screen limits of Graphics Mode 8.

Line 120 creates an endless loop. If you program a loop in BASIC with a STEP size of zero, that loop will never end. Since we have a beginning value of zero and an exit value of one, the loop will never reach one until we reset LOOP to a value higher than one. This is as close as we can get to a REPEAT. . .UNTIL construct in Atari BASIC.

Lines 130-140 set the graphics mode and set the background and border colors to black.

Lines 150-160 select a random number between 10 and 80 for the AMPLITUDE (height) of the wave.

Lines 170-180 select random numbers between 5 and 75 for the PERIOD of the wave. The period of a sine or cosine function determines how many times the value returned from sine or cosine will cycle within a given space. The smaller the number, the more "hills and valleys."

Line 190 places a random value between 1 and 6 into the variable SIZE.

Line 200 uses SIZE as a STEP value in a FOR/NEXT loop which determines the number of X points to be plotted along the X axis.

Line 210 figures the first Y axis point. Look at it as BASIC would, beginning from the innermost set of parentheses. XPOINT and SINEPERIOD might typically hold values of 110 and 30 which result in 3.66 when divided. BASIC will then calculate the SIN of the result, which will yield -0.5012.

This is then multiplied by SINEAMPLITUDE, (typically around 50) giving an answer of -25.06. Since sine and cosine values may range below zero, and BASIC cannot PLOT negative values, we add half the screen height (YRES/2) in order to shift the dot about halfway down the screen.

Line 220 performs the same action as 210 for the cosine value.

Line 230 PLOTs the first pair of points, using XPOINT and SINEY, and DRAWs a line TO the right side of the screen minus XPOINT and COSINEY.

Line 240 checks to see if a key has been pressed while the computer was figuring and drawing the line. If so, it cleanly finishes the loop by setting the XPOINT counter to its highest expected value, which line 250 awaits to finish its drawing loop.

Line 250 completes the logic of the drawing loop.

Line 260 places the value of any key pressed during the loop into KEYPRESS. Line 270 then checks to see if the character pressed was an X. If so, the value for the LOOP counter is set greater than its exit value and we the leave loop—and the program.

GEM COLOR SINE

Now that we've gone through the BASIC program, let's take a look at how it works in the C listing, step by step. If you are unfamiliar with C, you should first read our sidebar—C at a Glance.

The first two lines of the C listing are comment lines bracketed between /* and */. The next five lines cause the C compiler to **#include** files containing previously typed definitions that may be used throughout the program. You may use or ignore these definitions as you see fit.

The whole next block of code—down to, but not including **main( )**—is our declaration of the variables and arrays to be used by the program. The first two lines are required by GEM and provide a way to send GEM control and input parameters, while GEM sends back parameters as answers or limitations.

The rest of the int's are 16-bit variables which we chose for the program. There are also two doubles because these variables will be required to hold values greater than 16 bits.

extern double means that these are routines already saved on another disk file which we will link in our program during compilation. *Think of these routines as pre-written functions.*

continued on next page

Since our program is small, it will all be contained within the **main( )** function. All functions called within **main( )** will be provided by either the C library, or whichever files are included or linked at compilation time. Most of the functions will be GEM calls.

THE MAIN

Now that we've taken care of all the declarations, let's look at our **main( )** program, step by step.

The first thing you see is a left curly bracket (brace). This means "begin." At the bottom of the program, you will find the right brace which means "end." But within the program are more braces containing the beginning and ending of logical routines

Our first actual program statement is **appl_init( );**. We can see that it's a complete statement since it ends with a semicolon. **appl_init( )** is a routine that prepares GEM to receive information from our application.

Following this is **handle=graf_handle(&dummy, &dummy, &dummy, &dummy);**. Since GEM can have more than one screen window open at any time, we need a way to keep track of which window we want.

When we make this call, GEM assigns a number to the new window and stores it in the variable we have chosen to call "handle."

GEM returns additional information from the **graf_handle** call—such as the X,Y co-ordinate of the upper left corner of our window. Our program doesn't use this information, but we need to provide parameters (**&dummy**) for GEM to store the data.

C "FOR" LOOP

Now we get to a statement which is very similar to a BASIC FOR/NEXT loop. The elements are: FOR (entry condition of loop; condition to be satisfied for the loop to continue; STEP value for loop). In BASIC this would be: FOR I=0 TO 9 STEP 1: NEXT I.

In C the loop says: for (i starts at zero; continue as long as i is less than 10; use i, then increment it). The last part could also have been written as i=i+1, or, more cryptically, i+=1.

The instruction executed within the loop is contained between the braces. This loop fills an array called **l_intin** with information such as line style, color, and character size. This data is needed by GEM prior to opening the graphics window.

The next statement is **v_opnvwk (l_intin, &handle, l_out)**; similar to a GRAPHICS call from BASIC. **l_intin** is the list of parameters passed to GEM that we prepared above. **&handle** means: "give the address of the handle to GEM", and **l_out** is an array that GEM returns describing things like screen size and number of colors. We can later access these values if and when we need them.

For example, right below we use three of those values. **xres** is how wide the screen is, **yres** is how high the screen is and **max_color** is how many colors we can work with on the device opened. By using these variables, instead of constants, we can be assured our program will work in all video resolutions.

Now, we encounter a FOR loop which directly corresponds to the FOR loop in the BASIC program that defines our "endless" loop. This line reads: Loop starts at zero. Continue as long as loop is less than one. Each loop add nothing to Loop.

The next DO WHILE construct will choose a color. It reads: DO choose a random number called COLOR between 0 and 15 WHILE COLOR is less than zero OR (the two vertical lines mean OR) COLOR is greater than the maximum number of colors we can show on the screen.

The next line, **vsl_color (handle, color);**, corresponds directly to the COLOR statement in the BASIC program. It selects which color the line will be drawn with next.

The next line selects a random number between one and four for the STEP value in our drawing loop.

The next four DO WHILE constructs will select a random number for the amplitude and period of our sine and cosine values in the drawing loop.

DRAWING LOOP

Now we enter the drawing loop itself, which uses the variable **iter** as a counter across the screen.

We indent again to show we are in another loop.

Next we set **xpoint**, a double precision variable, equal to the value of **iter** so we can perform floating point math on it.

The next two pairs of lines will figure the values needed for our two line endpoints. The GEM call that draws a line is called **v_pline( )**, but before we call it we need to figure in advance which X,Y points the routine will draw to. Then we place them as elements in an array variable which will become one of the parameters in the GEM call. We could specify more than just one pair of points if we needed to.

V_PLINE

We now come to the nucleus of the program: **v_pline( )**. This call reads: "GEM, draw a polyline inside window 'handle'. The line has two points and the X, Y coordinates for the line are in an array called 'ptsin'."

v_pline( ) is very much like the BASIC USR calls which are in **Antic's** GUP program (June, 1985). You establish your parameters and variables, then place them in the parentheses and make the call. GEM does the rest.

The matching brace which ends our drawing loop FOR construct acts the same as NEXT in BASIC.

ENDLESS LOOPING

We now come to a DO WHILE construct that creates an endless loop. The GEM call **vq_key_s( )** will cause GEM to put the value of Shift/Alternate/Control keys in a variable called **key_state**.

It will continue to do this as long as **key_state** is equal to zero, which means no keys are pressed. (The **==** means "test for equality" and is different from a single **=**, which means "is assigned the value of.")

The IF statement causes the loop to exit by comparing the **key_state**

value to eight—the value of the Alternate key. When the Alternate key is pressed, **key-state** is set to eight and the value for our "endless" loop counter is incremented, causing the exit of the loop.

If the alternate was pressed, we fall down to the **v_clsvwk(handle)** call, which will free the space GEM set aside for our workstation.

Then we come to the **appl_exit( );** call, in which we "un-hook" our application from GEM, and free the memory used for other applications.

The last line is the brace that ends our main( ) function.

We hope this detailed take-apart gives you some idea of how GEM is implemented in the Atari ST. Many of you have never used C, so you may have to struggle a bit. Again, take a look at GUP in our June, 1985 issue. GUP is very similar in concept to the GEM calls. The main difference is that GEM uses the elements within arrays and the arrays utilized as parameter elements in the calls.

Listing on page 66.

C AT A GLANCE

C is a compiled language, like assembly language. This means the original program is written on a text editor and saved in a file called the "source" code. This source code is compiled (translated) into machine or "object" code.

C source code contains no line numbers. The compiler uses spaces as delimiters between the recognizable symbols. Therefore it ignores spaces and carriage returns. For this reason, you can write C source code in any format you please. However, over the years certain standards in C formatting have developed.

By custom, C code is written in lower-case letters, although it usually doesn't matter to the compiler. Indentation is an important element in C readability. Nested loops, for example, are indented.

NO LINE NUMBERS

Since there are no line numbers, the compiler recognizes the semicolon (;) to separate logical lines or statements. Similarly, there are structures—such as the BASIC FOR/NEXT loop, or the ACTION! DO. . . OD structure—which require a delimiter that does not even appear on the Atari 8-bit keyboard. This is the curly bracket "{". Left curly bracket means "begin" and right curly bracket, "}" means "end."

DECLARING

In Atari BASIC, all strings or array variables must be DIMensioned so that BASIC knows how much room in memory to reserve for them. In C, *all* variables must be "declared."

This is necessary because C variables can take up different amounts of memory, depending on their data type. Declared variables can be a "char" (8 bits), "int" (16 bits), or "double." (32 bits).

Let's take a quick look at the overall structure of a C program, and then we'll list some books which can really give you the details.

C programs are made up of a group of subroutines called "functions." Functions may be written by the user, provided by the C compiler, or provided by other files called "libraries." These library files are merged with the code during compilation.

BASIC programmers may think of functions as USR calls. Parameters may or may not be passed to them, and values may or may not be expected in return.

Each function title will contain the name of the function, followed by a pair of parentheses which contain any required parameters. If a value is to be returned by a function, the word "return" followed by parentheses must appear at the end of the function.

MAIN

Every C program must have one function called "main", which calls the others. A small C program may contain only the main function. To follow a C listing, first look within the main function, which will act as a "table of contents" of the other functions.

Since C functions may come from the language, or the user, or the library files, it becomes a matter of experience to differentiate between those function titles reserved by the language and libraries, and those created by the programmer. In the specific case of the Atari ST GEM libraries, any function beginning with the letter "v" will be part of a GEM VDI call.

C BIBLIOGRAPHY

THE C PROGRAMMING LANGUAGE
by Brian W. Kernighan and Dennis M. Ritchie
Prentice-Hall Software Series
Englewood Cliffs, NJ 07632
228 pages, paperbound
$24.50

SUREFIRE PROGRAMMING IN C
by Warren A. Stewart
TAB Books, Inc.
Blue Ridge Summit, PA 17214
270 pages, paperbound
$16.95

THE C PROGRAMMING TUTOR
by Leon A. Wortman and Thomas O. Sidebottom
Robert J. Brady Co. (Prentice-Hall)
Bowie, MD 20715
274 pages, paperbound
$19.95

UNDERSTANDING C
by Bruce H. Hunter
SYBEX, Inc.
2344 Sixth Street
Berkeley, CA 94710
320 pages, paperbound
$17.95

LEARNING TO PROGRAM IN C
by Thomas Plum
Prentice-Hall, Inc.
Englewood Cliffs, NJ 07632
230 pages, hardcover
$32.95

Listing on page 66.

FIRST ST PERFORMANCE TEST

Mac eats the ST's dust

by PATRICK BASS, **Antic** ST Program Editor

Perhaps it's in our blood . . .

Seems as if people just *need* to rate and compare things to see which is the fastest or most powerful. This certainly holds true when it comes to rating different computers against each other.

One standard that's used for comparing computer performances is speed of program execution. The same program, in the same language, is run on different computers.

Since 1981, Byte Magazine's "Prime Number Benchmark" has been the most widely accepted test of computer speed. This benchmark program is a simple procedure for finding all the prime numbers betwen 3 and 16,381. It adapts the Sieve of Eratosthenes, which has been around since the third century B.C.

THE SIEVE

How does the Atari 520ST stack up?

Figure 1

Computer	Operating System	Language	Run Time (Sec.)
68000 Atari 520ST	TOS	C Digital CP/M 68K	3.8
68000 Apple Macintosh	—	C Manx	7
68000 Apple Macintosh	—	C Hippo L2	13
Z8001 5.5 MHz	Unix	C	1.97
Z8000 Z-Lab	Zeus Unix	C	4.8
Z80	CP/M	Digital BASIC	15.7
Z80	CP/M	MicroSoft COBOL	5115
6502 Atari 800	OS Rev.B	ACTION! display off:	12.2
		display on:	17.9
6502 Atari 800	OS Rev.B	BASIC	389
6502 Atari 800	OS Rev.B	BASIC XL	214

Antic thanks Craig LaGrow of Computer Language magazine for providing comparative C run times, and Bill Wilkinson of Optimized Software Systems for the Atari 8-bit language run times.

We typed the "Prime Number Benchmark" into our 520ST using C language and timed how long it took to run.

The 520ST turned in a time of 3.8 seconds. This speed puts it right up there with minicomputers running the UNIX operating system! (See *Figure 1.*) A Z8000 Z-Lab Zeus UNIX minicomputer running C took 4.8 seconds, and a Z8001 5.5 MHz mini running C on UNIX took 1.97 seconds.

At the low end of the scale, microcomputers running the benchmark took from 15.7 seconds (Digital BASIC on a Z80 microprocessor) to an astounding 5115 seconds (1 hour, 25 minutes) on a CP/M Z80 running COBOL.

ST VS. MAC

The Macintosh is the closest relative of the Atari 520ST because both machines use the 68000 microprocessor. Fastest Macintosh time for running the Sieve program in C was 7 seconds and the slowest was 13 seconds. The 520ST left Mac in the dust!

Note that this test does not depend on any I/O devices. Some computers might run a program blindingly fast, and then take the rest of the afternoon to write the results to disk. Other computers might take longer with the same program but write to disk quicker, thus completing the entire task in less time.

Suppose we had selected a benchmark test that included sorting a number of disk files. The speed of the disk drive hardware and software could be as important as the actual speed of the computer. Printers also tend to slow computers down a lot. An Atari 520ST can execute more than 10 million instructions in the time it takes a printer to perform a carriage return!

We can also speed up the way a benchmark program performs its job. One common technique for doing this to take advantage of special hardware features found on your particular computer. A familiar example for Atari 8-bit computer users would be to turn off the screen and speed up the program by 30 percent.

MERE TWO MILLION?

Just how fast is fast, anyway? Sometimes it seems funny to praise one computer for performing 8 million operations per second and then scorn another computer that *merely* performs 2 million operations per second. How long would 2 million operations take you with a pencil and paper?

ST PRODUCT NEWS

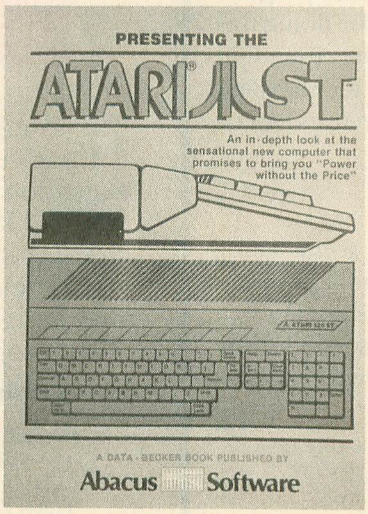
First ST review

Reviewed by Jack Powell

Presenting the Atari ST has the distinction of being the first ST product to arrive at the **Antic** offices. It showed up here on Tuesday afternoon, May 28 and we were all pretty amazed. The computer was not in general release, and we had just plugged a newly revised operating system into our development 520ST. Yet here was a book about it!

So what do we have here? Well, the frontispiece showed this is a translation of a book published in Dusseldorf, West Germany. (We have a copy of the original that was brought back from the Hanover Electronics Fair. But we were unable to find any German-reading Atarians to help us do something with it.) Presumably the authors had a head-start, since the ST was released first in Canada and Europe.

Eagerly tearing into the English version, we found a compilation of information previously available about specific parts of the machine—but probably not available from Atari. Much of this information is not always specific to the ST, but it's still handy to have everything in one place.



PRESENTING THE ATARI ST
Abacus Software
P.O. Box 7211
Grand Rapids, MI 49510
(616) 241-5510
$16.95

The book starts with a brief description of the evolution of the 16-bit processor, then focuses on the Motorola MC68000, which is the heart of the Atari ST.

This leads to an overview of 68000 assembly language, including a list of the instruction set, diagrams of the registers, and some examples of the addressing modes. The whole section is presented at an introductory level. Although none of it will teach you 68000 machine language, it does offer an idea of what is in store if you pursue the subject further.

Unfortunately, the authors provide no bibliography of outside reference material to guide the reader.

Presenting the Atari ST then concentrates on peripherals, beginning with a very informative block diagram of the relationship between

the CPU, the special chips, the ports, and the peripherals. It spends a couple of pages on each of the peripherals and chips.

The book is an odd mixture of highly technical, but sketchy, hardware-specific information, followed by elementary material. An entire chapter is devoted to Logo. It takes up space, but does not really tell enough for a practical tutorial.

Another section has a diagram of the pin-outs of the 68000. This could be informative, but the authors don't follow through with a discussion of what it means.

There are several inaccuracies because the authors made assumptions based on incomplete or outmoded information. For example, they had no way of knowing that the 520ST's GEM would first be released on disk. So they refer to it as being in ROM.

One section gives a very clear explanation of how BDOS and BIOS works, and then goes on to list BDOS and BIOS function numbers in CPM/68K—which we now know are not the same numbers as in TOS (Tramiel Operating System).

Nevertheless, Presenting the Atari ST gives a clear overview of the new machine, and is fairly accurate, considering the limited information available at publication time. Predictably, there is a certain amount of padding, but most prospective ST buyers will still be happy to get their hands on it.

Antic congratulates the authors for accomplishing so much, so quickly. The publishers tell us they plan four more books on the ST before the end of the year. No doubt these will provide much more detail. We look forward to adding them to our Atari ST library.

Under development

Flash! Just as we went into print, **Antic** received the completed **4xFORTH**, an 83 Standard Forth from the Dragon Group. It's available right now at $99.95 retail. And it's fast—twice as fast as MacForth. It's also capable of multi-tasking and multi-user functions on the ST. This is probably a first for any microcomputer. Look for an in-depth review in the ST Section soon.

Atari has been busily working with developers. They assigned Arrakis Technology to produce a disk tutorial for the new machines and some dealer demos.

Atari is also working with Mosaic Software to transfer their successful Lotus 1-2-3 clone, **Twin**, to the ST. On the IBM version, Twin can read Lotus 1-2-3 files. On the ST, Twin will retail for $99 and will be available in the fall.

Meanwhile, there should be no shortage of quality languages for the ST. Philon, Inc., a leading developer of language compilers for M68000-based minicomputers, announced plans to produce all their compilers for the ST. Philon currently has compilers in C, BASIC-C, BASIC-M, COBOL, FORTRAN, and PASCAL. The first compilers available for the ST will be BASIC-M and BASIC-C at $79 each, followed by C at $149.

ERRATA: Last month, we mistakenly reported that Sublogic would be producing **Financial Cookbook** for the ST. We should have said Electronics Arts is transfering this program to the new Atari. Sorry, EA.

4xFORTH
Dragon Group
148 Poca Fork Road
Elkview, WV 25071
(304) 965-5517

ARRAKIS TECHNOLOGY
(Tutorials & Demos)
1425 Dorchester Blvd. West, #400
Montreal, Quebec
Canada H3G 1T7
(514) 875-5477

FINANCIAL COOKBOOK
Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415) 571-7171

TWIN
Mosaic Software
1972 Massachusetts Ave.
Cambridge, MA 02140
(617) 491-2434

PHILON, INC.
(Compiler Series)
641 Avenue of the Americas
New York, NY 10011
(212) 807-0303



BANJO PICKER

Play bluegrass music like a bionic Earl Scruggs!

by RICHARD K. LINDGREN

Program your Atari to make sounds like an automated five-string banjo. Then just press two keys and you'll be strumming bluegrass rhythms like a bionic Earl Scruggs. Banjo Picker is a BASIC program that works on all Atari computers of any memory size.

Even if your manual dexterity is so bad that you can barely type with two fingers at a time, your Atari and the Banjo Picker program will enable you to pick fancy banjo chords at a speed and accuracy rivaling Earl Scruggs . . . or at least Steve Martin.

All you need to do is type in Listing 1, check it with TYPO II, and SAVE it.

WHAT IT DOES

Banjo Picker uses the Atari's four sound generators to simulate the style of a five-string banjo. Each string in the sequence starts out at high volume, then reduces volume by steps as the successive strings are played. By the time the fifth string in the sequence is played, the first has reached zero volume level, and can be sounded again.

The program can play 11 different 8-note patterns for 13 chords. When you RUN Banjo Picker, you'll see the current chord and pattern numbers displayed at the top of the screen. Below this line, you'll see a diagram of the banjo neck. A bouncing ball follows each string as it is played in sequence.

At the bottom of the screen is a display showing which Atari keys control the chords and picking patterns.

PICKIN' YOUR ATARI

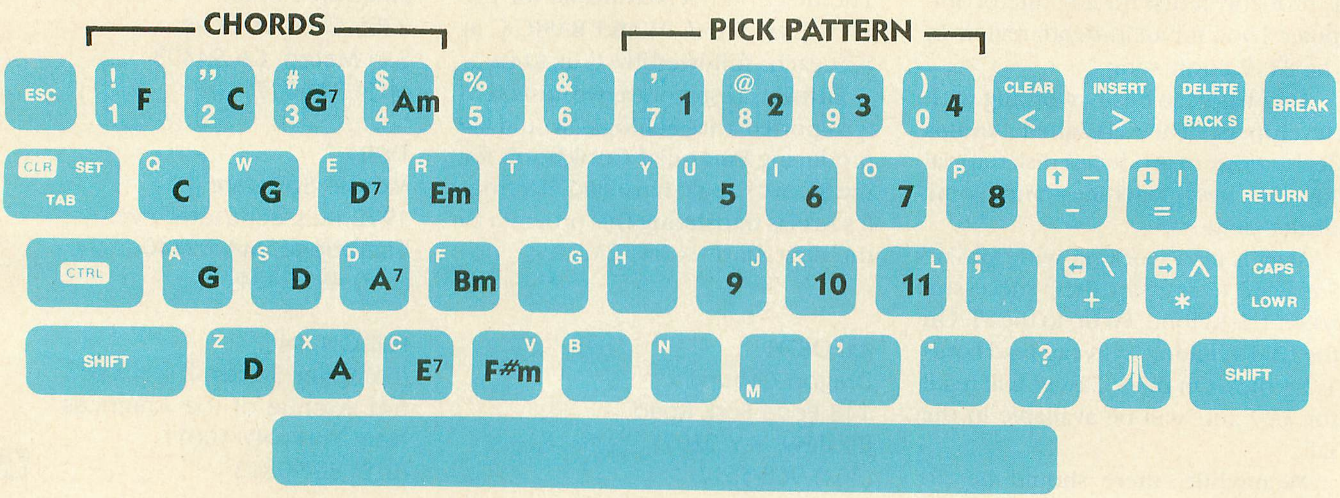
You'll see a helpful diagram of the Banjo Picker operating keys in *Figure 1*.

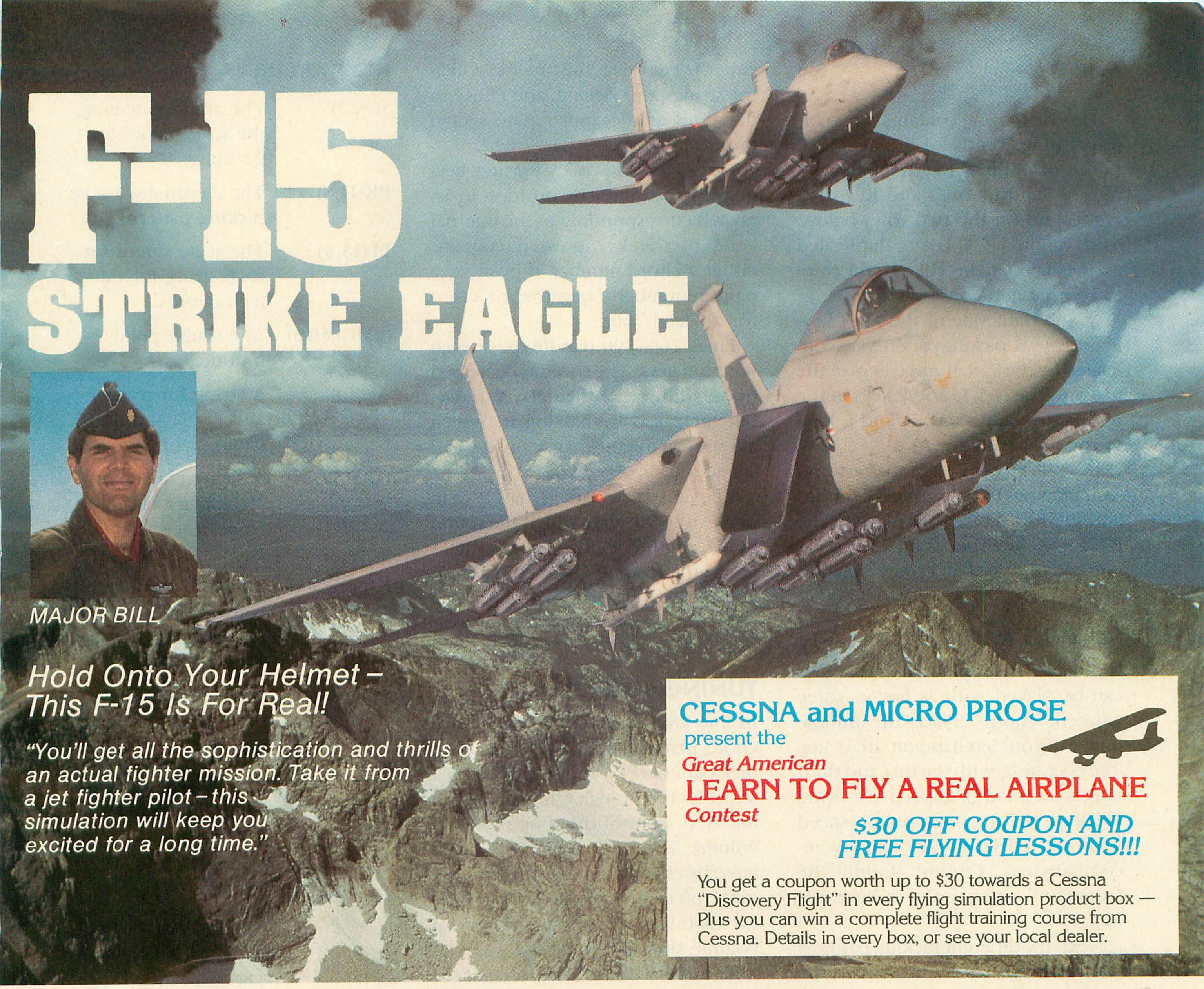
The chords are arranged in "autoharp" fashion on the left side of the keyboard, four rows of four keys each. The four related chords in a musical key are found in each row.

For instance, the top row contains the Key of C, with keyboard numbers 1 through 4 controlling the subdominant chord (F), the tonic (C), the dominant seventh (G7), and the relative minor (Am), respectively.

continued on page 30

Figure 1





CESSNA and MICRO PROSE present the *Great American* **LEARN TO FLY A REAL AIRPLANE** *Contest*

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• MK-82 Bombs	Yes	Yes	No
• Air-Air Missles	Yes	Yes	No
2. Sophisticated Electronics			
• Heads Up Display	Yes	Yes	No
• Radar	Yes	Yes	No
• Electronic Counter Measures	Yes	Yes	No
• Inertial Navigation	Yes	Yes	No
3. Real Combat Missions	Yes	Yes	No
4. Developed and Tested by Real Fighter Pilots	Yes	Yes	No
5. Aerobatic Flying (Loops, Splits, and YoYos)	Yes	Yes	No

F-15 Strike Eagle is available for Commodore 64/128, Apple II and Atari XL/XE computers for a suggested retail of only $34.95. Also for Macintosh and IBM PC/PC Jr., for a suggested retail of $39.95. Call or write for more information or MC/VISA orders.

GREAT REVIEWS!

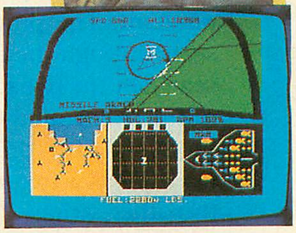
ANTIC – F-15 STRIKE EAGLE
Launch into the most exciting aerial combat since Star Raiders with the F-15 Strike Eagle... F-15 is an engrossing game which challenges pilots of all skill levels..." Charles Jackson

USA TODAY – F-15 STRIKE EAGLE
"... this is more than the right stuff. Once you've gotten used to flying these banks it will be hard to go back to just cruising from LaGuardia to Logan. F-15 is definitely the only way to fly." Marc Randolph

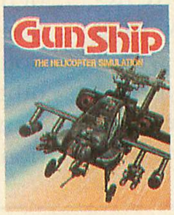
ANALOG – F-15 STRIKE EAGLE
"...Don't wait. RUN down to you local software merchant and buy a copy of F-15 Strike Eagle today. Tomorrow may be too late!" Patrick J. Kelley

RUN – F-15 STRIKE EAGLE
"...The F-15 Strike Eagle is not an arcade game, but, rather, one of the most realistic combat flight simulators I've ever seen. If you're looking for a chance to experience some high adventure and danger in a realistic and challenging format, F-15 Strike Eagle is for you." Peter Paplaskas





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BANJO
continued from page 28

The next row contains the corresponding chords for the Key of G, the most popular Key for bluegrass music. The Key of D and Key of A chords are on the two rows below. Three chords (C,G,D) are duplicated on the keyboard in order for the rows to be arranged consistently.

At the right side of the Atari keyboard, the 11 picking patterns are controlled by the 7, 8, 9 and 0 keys in the top row, the U, I, O and P keys in the row below, and the J, K and L keys in the next row down.

Use the [START] key to start and stop playing. Initially, the "G" chord and the first pattern are played. The [OPTION] key speeds up your picking and the [SELECT] key slows it down.

MAKING MUSIC

Hundreds of simple folk-type songs can be played with as few as three adjacent chords. Place the middle finger of your left hand on the W key (the G chord), with the first and third fingers on E and Q, respectively. Bring the playing up to a comfortable speed with the [OPTION] key and try accompanying "Comin' Round the Mountain" using only these three fingers.

Next, try different picking patterns with your right hand and listen for the rhythm. Each pattern has eight notes, so it is best to change as the eighth note is played. When you are trying to change the chord and pattern each time, press the chord key slightly before the pattern key.

PROGRAM TAKE-APART

Lines 60–140 contain the heart of the program. The program sequentially steps through the frequencies represented by the five strings. The banjo's distinctive sound comes from the shortened fifth "drone" string, which usually has a frequency higher than the other strings.

The program rotates these five frequencies through four calls to a machine language routine which quickly POKEs the appropriate SOUND parameters with decreasing volume for each frequency. The pick pattern determines the order in which the strings are selected, and POKEs a diamond at the appropriate screen location.

Lines 160–250 check for new keyboard selections. The position in array KB corresponding to the internal code of the key pressed contains either a chord number, if positive, a pattern number if negative, or a zero for a "dead" key.

Lines 260–300 handle the special function keys. The speed is decreased by an addition to the delay variable, but increased by halving it, which allows you to quickly get any desired speed.

The initial display is handled in lines 310–370, after which the sound POKE routine and frequency values are read into arrays. Next, the chords and pick patterns are read in, along with the internal code for the corresponding keyboard position.

TUNING YOUR BANJO

In line 580, you can alter the initial chord played (variable P), the initial pick pattern (PP), and the speed (W). Variables C1 through C4, initialized in line 570, control the tone type and volume. The volume fade can be altered by changing these variables, adding 160 to the volume level (0—15) for each sound generator. The total volume should not exceed 32.

The chord data is composed of the internal keyboard code, followed by the appropriate positions in the frequency array (PL) for each of the five strings and the chord name.

These can be changed to create new chords or to place them on different keyboard keys. The key's internal code is not the same as its ASCII code. To find the internal code for any key, use the one-line program below. The code for each key will be displayed as it is pressed.

```
10 PRINT PEEK(764) : GOTO 10
```

Likewise, the pick patterns consist of the keyboard code followed by the numbers of the strings in the eight-note sequence. These patterns and others can be found in **Bluegrass Banjo** by Peter Wernick (Oak Publications, 1974).

KEY VARIABLES

SC(22)	The array containing the scale values for 22 notes.
PK(11,8)	The eleven eight-note picking patterns.
PL(13,5)	The scale values for each string for thirteen chords.
SIMUL$(16)	The sound poke routine.
A$(30)	A string for reading and displaying the banjo picture.
CN$(39)	A string containing 3-character chord names for each chord.
KB(63)	The array which contains the chord or pattern numbers for each keyboard key.
ST1	The screen address next to the string being played.
F1-F4	The current poke values for frequency.
C1-C4	The current poke values for tone and volume.
U	The address of the sound poke routine.
LST	The last key pressed.
P1,P2	Positions in string CN$ containing the chord name.
W	The speed delay value.
P	The current chord being played.
PP	The current pick pattern.

*Richard K. Lindgren is a CPA and a business professor at Graceland College in Lamoni, Iowa. He is author of a new Antic APX Classic two-program disk, **Real Estate Cash Flow Analysis** and **Strategic Financial Ratio Analysis**. When finance gets dull, he picks a homemade, left-handed banjo.*

Listing on page 55



by Spencer Craske

"A Paranoid Fantasy" is the author's fitting subtitle for this implacable and intimidating arcade game. Smash the lights, avoid the contagious inmates, snatch every key. But whatever you do, keep moving—or you'll go mad. This BASIC program works on all Atari computers of any memory size, with disk or cassette.

Jack Nicholson didn't have it nearly this tough in "One Flew Over the Cuckoo's Nest."

Tough break, sucker. During your interplanetary travels you were unjustly thrown into an insane asylum. Never mind why. And you better believe this funny-farm isn't like any sanitarium back home on good old Earth...

RED OCTOPI

All the other inmates are these octopus-like red aliens who have been pumped full of pacifying drugs. They don't ever do anything except stagger mindlessly like zombies from left to right.

High dosages of those pacifying drugs have produced a truly horrifying side effect in the red-octopus aliens. Yes, you guessed it! An inmate's merest touch is instant death to Earthlings. You lose a life that can only be re-earned with 10,000 points.

Is there no faint glimmer of hope?? C'mon, get serious. Of course you've got one chance in a million. What more would you expect?

The keepers may be sadistic, but they're also lazy and they left the keys lying around! Grab all the keys on the screen and you can move on to the next screen.

Is there a way to escape the Asylum? Maybe, but we never found it. Probably all you can do is keep alive your sanity and yourself, and hope somebody eventually lets you out.

LIGHTS OF DOOM

To stay sane, you must keep moving. If you stay in one room, you will gradually go mad under the endless glare of the hundreds of Living Lights. These Living Lights move too—from right to left, at a faster pace than the zombie-brained inmates.

Smash out those lights, I tell you.

continued on page 34



LEMONADE

Article by GIGI BISSON
Program by BOB POLARO

Photography Linda Tapscott

Lemonade is a well-known educational simulation that teaches children basic economic concepts. Bob Polaro's excellent Atari version used to be available in the old Atari Program Exchange catalog. Recommended for ages 8 to 12. This BASIC program works on all Atari 8-bit computers of any memory size, with disk or cassette.

Have you ever dreamed about starting your own small business? Lemonade tests your business sense. Your lemonade stand could make you rich. But if your business is a lemon, it could make you bankrupt. And if you go bankrupt, the game's over.

THE SQUEEZE

When life gives you lemons, you can make lemonade. But you might not necessarily make a profit. The object of the Lemonade game is to make lots of money by weighing your lemonade production and advertising costs against anticipated sales.

Your costs vary with supply and demand, inflation, or lemon shortages. Other conditions such as strikes and road construction can also affect your sales. And watch out for rainstorms! As in the real business world, you don't see the effects of these problems until after you've committed your assets.

Does this sound complicated? Actually, Lemonade is very simple to play, but it teaches these complex economic concepts. Playing Lemonade is a little like playing Monopoly—or like an earthbound version of the science-fiction business game M.U.L.E.

Of course, the object is to be a shrewd investor and make lots of bucks. Meanwhile, you'll learn something about the laws of supply and demand, the effects of advertising your business, and the influence of unexpected events on business ventures.

The information is presented in color and there are a few sound effects, but no graphics. Lemonade probably wouldn't hold the attention of young children very long. But older children will find that making money can be as much fun as zapping space aliens! Teachers can easily use the program to support lesson plans that define terms like "assets" and concepts like "inflation."

HOW TO SUCCEED

You run a lemonade stand. It costs you money to make lemonade and to advertise your stand. The object is to make decisions that will help you earn as much money as possible.

To start your lemonade business, type in the program, check it with TYPO II, and SAVE a copy before you RUN it. **Antic** disk subscribers will find the program under the file name LEMONADE.BAS. When you begin the game, you will see a color display telling you it's Day 1.

You begin with $2 in assets. (Assets are how much money you have to spend.) You use your assets to buy ingredients and make signs. On the first day, it only costs you 2 cents to make

continued on page 34


Flight Simulator II
For Atari computers with 48K memory
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game of the month

ALIEN ASYLUM
continued from page 31

It is your only defense against the encroaching madness. Break a light and you gain one sanity point, leave a light unbroken and you lose one point. If you have 99 sanity points you are perfectly sane. At zero sanity points you are utterly insane and you lose one life.

Displayed at the bottom of the screen are your score, lives, play level, sanity points and number of keys left in the room.

The higher the level, the faster the inmates come at you, and the more keys you must snatch in order to keep going.

Type in Listing 1, ASYLUM.BAS, check it with TYPO II and SAVE a copy before you RUN it. Now get ready to fight for your sanity.

One way this game provides the illusion that you're going crazy is the diabolical joystick action. There's an inertia routine in lines 200-220. If your joystick isn't moving (LX and LY are both zero) your player continues sliding along in one direction until it either hits a wall, or hits an inmate and dies.

FAKE SCROLL

Asylum uses the time-honored Atari design tool of redefining a character set in Graphics 1. However, there is one unusual technique in the program (which I admit I discovered by accident) that goes a long way towards disguising the low-resolution movement.

In line 390, NF stores a bit pattern (8 bits in a row) consisting of 7 bits off and one bit on. Each time NF is multiplied by two, the bit that's on moves one position. Thus, the smooth movement of all the Living Lights is accomplished by repeatedly POKEing a doubled number into the character—1, 2, 4, 8, 16, 32, 64 and finally 128. This gives the impression of a scrolling movement as the white dots march relentlessly across the screen from right to left.

Spencer Craske lives in Paradise. That is, the town of Paradise in Newfoundland, Canada.

Listing on page 62

bonus game

LEMONADE
continued from page 32

every glass of lemonade, but that won't last for long in these inflationary times!

Some days, you might see special conditions that will affect your business. For example, a Teamsters Strike. This means the truck drivers who deliver your lemons aren't working. So the cost of lemons and the demand for lemonade will go up, and you can charge more.

If Roadwork is displayed, the road will be blocked and customers won't be able to get to your stand. Or, if prices are down, you'll have to advertise more or charge less because demand will be down. If there's a Heatwave, you're in luck—people will be thirsting for your product.

Now you have to decide how many glasses of lemonade to make. Type in a number. You can make up to 99 glasses. (If you want only five glasses, type in 05.)

Instantly, "Signs at 15 cents" will pop up. Sometimes the price will change. The more signs you make to advertise your stand, the more lemonade you'll be able to sell. You can make up to nine signs.

"Price/Glass" will appear next. Think about your costs and the conditions and then decide how much to charge. You can charge up to 99 cents a glass. But remember, if you get greedy and charge too much, people might decide to drink the New Coke instead.

Now the computer will ask, "Is this okay?" Type [Y] if it is. If you want to charge a different price, type in [N] and start over. The new numbers will replace the old ones on screen as you type them in.

The computer will do your accounting and tell you how many glasses you sold and how much money you made.

If life is sweet, keep going until you've made lots of money and become a lemonade tycoon. Of course, if your business goes sour, you might go bankrupt. If that happens, don't get bitter. Just press [START] and try again.

When Bob Polaro was a programmer at Atari, he wrote so much software that people used to jokingly refer to him as "Bob Co." He now runs an educational software programming business, Bob Co., in Santa Cruz, California.

Listing on page 63

SEE HALLEY'S COMET ON YOUR ATARI

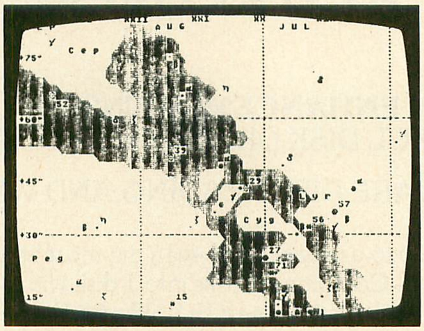
New software super-maps!

by GIGI BISSON, **Antic** Assistant Editor

Space Base, Halley Patrol, and **Earth Views** are three new educational programs that bring space vistas into your living room with amazing impact.

This software opens up the map-making potential of 8-bit Atari computers in ways never seen before—rapidly producing sophisticated and scientifically accurate images.

It's doubtful whether these programs could have been written—or run—on any 64K computer but the Atari. Because sales were limited to the Atari market, the authors couldn't find a publisher willing to take a chance on such high-quality scientific material. So the programs are now available only from the Antic Arcade Catalog in this magazine.



HALLEY PATROL

It may be your only chance to see Halley's Comet.

"The comet won't be visible from the Northern Hemisphere unless you really go out of your way," says programmer and amateur astronomer Jeff Mehlman.

But with Mehlman's Halley Patrol, the comet will be visible on your Atari. It soars across the screen against a changing background of stars, as celestial coordinates flash below to indicate the location.

Click. Find out the best month to observe the comet, when the moon and sun aren't at their brightest in your hometown skies.

Click. Pick any day between November, 1985 and May, 1986—and find out where the comet is, how bright it will be, and what it will look like.

"I'd make a lot more money if I could also write this program for the Commodore and the Apple, says Mehlman. "But those other computers are too limited to handle it."

Mehlman is employed as a software systems analyst for the Best retail

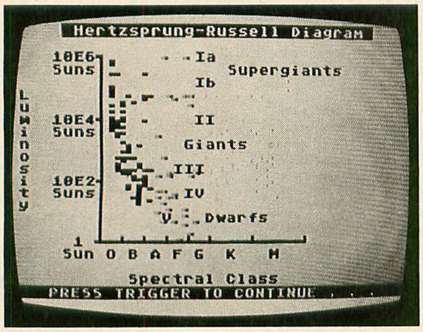
continued on page 38

HALLEY'S
continued from page 36

chain in Richmond, Virginia. He studied astronomy at Northwestern University.

"I was working on the graphics and trying hard to make the comet as realistic as possible, he recalls. My wife looked over my shoulder and said, 'Why don't you make it red with orange things shooting out of it or something?'"

He resisted the temptation to create a flashy lightshow. "The graphics would have been easy on the Atari," he says, "But I wanted to be astronomically accurate."



SPACE BASE

It's a cloudless, starry night. An extension cord snakes through the kitchen window onto the back patio, where a computer screen glows in the darkness.

"There's Orion," someone cries out. But is it really Orion? How do you know what you're really seeing in the heavens unless you squint at a sky atlas lit by a dim flashlight?

Enter the realm of computer-aided stargazing. Move your joystick to the right and an astronomical map of the 400 brightest stars in a vivid blue Milky Way Galaxy scroll by.

Zero in on Orion, press the joystick button and a starchart pops on the screen, indicating the star's color and temperature, along with its name, spectral type, distance from Earth in light years and other scientific information.

Press the button again, and a multicolored Hertzsprung-Russell diagram appears. This is an astronomy classification tool that indicates a star's color, temperature, luminosity and size in comparison to other stars.

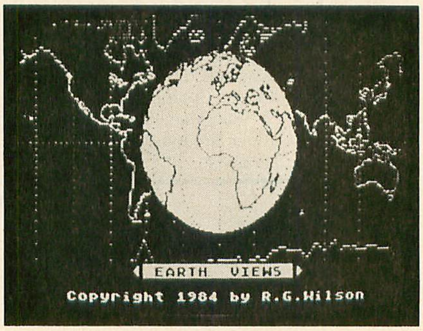
These are just a few of the ways you can use Space Base ($19.95, AP142), an astronomical database and sky atlas for the Atari.

Halley Patrol author Mehlman also wrote Space Base. And he is currently finishing an enhanced version of Space Base that works with a **Celestron Sky-Sensor Telescope**. With the new software and an RS-232 interface, the telescope will move to find an actual star in the sky that has been selected from the database starchart by pressing the joystick trigger.

The database for the software that controls the Celestron motor happens to be the same one used in Space Base, the Messier Catalog. It lists the 285 brightest stars among the 3,000 that are visible to the naked eye.

Mehlman also ended up writing nearly a full textbook of documentation for Space Base. "The program teaches the equivalent of about one year of college astronomy," he says. "Even if you just play around with it, sooner or later you're bound to learn something."

He daydreams about seeing Space Base used in a museum or observatory lobby. "This is the only fully labelled star atlas you can get," he says. The Greek letters, special star symbols, fine scrolling and minute detail are only possible with the Atari's redefined character capabilities. "Star programs on other personal computers just show a bunch of dots," he says.



EARTH VIEWS

Control the world with your joystick. Watch the Earth rotate in your Atari computer. Call up 250,000 different maps, each linked to a huge database of cities, states and continents. Get lost in the privacy of your own home.

Richard Wilson's Earth Views ($19.95, AP141) does some of the amazing things you expected from personal computers when you first bought one—and also some amazing things you weren't expecting.

Earth Views is the first program you can buy for any personal computer that depicts a 3-D image of the earth in rotation on any axis. It's also a geography lesson, trivia quiz, atlas and adventure game.

Wilson's globe display revolves on any axis, or from either pole. A geographic database of some 250,000 different views of Earth can be accessed 29 different ways from the keyboard and joystick. Instantly you can see Japan, Ancient Greece, Stonehenge, Delaware, Timbuktu. Map after map flashes up in high resolution format, so fast that it creates an illusion of "paging" from a huge mainframe computer.

When you put in the disk a flat map of the world appears, overlaid with a view of the earth as seen from space. Press [START] and the earth will begin to rotate. Press [SELECT] and you'll see the question "What place?"

Type in the first four letters of any state, province, river, island, nation, etc. For example; Lima, Peru. Instantly a world map appears, as seen from the viewpoint of a satellite hovering directly above Lima.

Ever wonder where you would end up if you tried to dig a hole to China from your hometown? Press the Inverse Video key and get an immediate display of the exact opposite end of the world.

Use the joystick to move an "airplane" over the world. Press [RETURN] and the name of that place appears. But if you fly over the Bermuda Triangle, watch out. . . You'll be sent on a geographical adventure/trivia game that fires off names of far flung places. You find one part of the world, only to be sent on another distant quest.

"Don't be embarassed if you don't have the faintest idea where a place is located," says Earth Views author Wilson. "The world is a big place, and even college-educated Americans are sadly weak in their knowledge of geography." He included a [HELP] key compass for those of us with a lousy sense of direction.

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At least one disk drive.
80 column printer.

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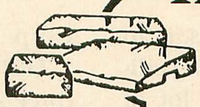
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A STUDENT TESTS S.A.T. SOFTWARE

Grades for Krell and HBJ

by DIANNA HARMS

My dad, Ken Harms, is an **Antic** contributing editor. He reads a lot of computer magazines and sees reviews of programs that are supposed to improve your SAT scores. But those reviews are written by computer buffs. Why not a review by a high school student who's actually going to *use* these programs to prepare for the college placement tests?

I'm about to start my high school senior year in Danville, Caliornia. I have taken the SAT and ACT tests about four times during the past six years—twice as part of a research project. I have a 3.75+ GPA and I score very well on verbal and TSWE. But don't ask me about math! And I'm certainly no computer whiz kid.

For this article, **Antic** sent me copies of **Computer Preparation for the SAT** ($79.95) by Harcourt Brace Jovanovich (HBJ) and the much more expensive **Krell's College Board SAT Exam Preparation Series** ($229.95) from Krell Software Corp.

HBJ's nice plastic package contains three double-sided disks, a 50-page User's Manual and a 469-page workbook, **How to Prepare for the SAT**, that's also sold separately for $7.95. Quite intimidating, do I really have to read all this?

Krell's package is a smaller, bookshelf-sized cardboard box. Open it and out fall eight single-sided disks, a 47-page booklet and all sorts of contest posters, catalogs, guarantees, etc.

Krell costs more, but the company offers to refund the purchase price if you fail to increase your score by 50 points after using the program for at least 6 hours. However, normal classroom learning over the months between SAT tests would probably get you most or all of those 50 points.

HBJ HASSLES

HBJ's disks are divided into three major sections: math and vocabulary drills, vocabulary flashcards, and four full-length tests. The User's Manual stated: "To run the software, simply insert the disk and turn on the power." I did. Nothing happened . . . several times.

Dad had to rescue me by suggesting that I try putting the BASIC cartridge into our 800 model. Thanks a lot, HBJ.

I followed HBJ's suggestion and tried the tests first. After several centuries of load time, I was rewarded with a simple screen giving several columns of numbers and blanks.

It seems you're supposed to read the question from the workbook, type the question number and then the answer, followed by [RETURN]. The program is so slow that I had to pause after each key.

For instance, the answer "23A" was [2], pause, [3], pause, [A], pause, [RETURN]. After all this, the program doesn't tell you if the answer is correct until the whole section is finished.

The section is automatically scored, wrong answers are highlighted and the correct answer is given so you can look in the workbook again. User friendly, it wasn't.

The drills are well organized by learning category (analogies/sentences, analogies/categories, etc.). For each question, you get two chances to answer correctly and you know immediately if you are right or wrong.

After answering, you can request an explanation. In general, I found the explanations helpful. They showed why the answer is correct and gave suggestions for solving similar problems. Although the math explanations were sometimes too simple, at least they made sense to me!

But after answering each question, the program infuriatingly asks, "Do you want an explanation? (Y/N)." A [Y] response tells you to "Press [E] for explanation". And if you press [N] the program says "Press [C] to continue." Even to me, it was obvious that these extra steps could be eliminated by intelligent programming.

On the plus side, HBJ'S workbook is a strong feature. It offers good old-fashioned study guidance, all the answers to test questions, and a good review of each subject area. Although it takes a lot of work, I think it'd be helpful for a brush-up. And it's only $7.95 without the software.

KRELL'S CASE

Krell's booklet gave simple and accurate loading instructions—a quick plus! The eight disks are divided into verbal and math, four apiece. Krell provides an "Automatic Learning Feature" (ALF) which is supposed to look at your performance and "alter the way in which problems are selected for presentation."

But I didn't see any change when I answered some questions with ALF turned on and some without. Vocabulary words were repeated anyway, even when I got them right the first time.

When the first analogy appeared on the screen, I was relieved that there wasn't a timer. That's because I spent most of the time thumbing through my trusty pocket dictionary. The words are ridiculous—much harder than I ever found on the actual SAT.

Example: The antonym of "RECALCITRANT" is "EMBLAZON, COMPLIANT, PROBITY, INCUBUS or SATURNINE." Yep, it sure is!

The drill gives no help or explanation, just the right answers. Questions appear quickly. Responses are accepted rapidly.

After each question, the program stops to show your cumulative score and waits for you to press a key to continue. I didn't like this. It broke my concentration and I wanted the score only after the end of a session.

THAT'S NO EXPLANATION, IT'S A DEATH SENTENCE!

Krell uses a scoring system of 4 for right, 0 for skip, and -1 for wrong. I have no idea if that approximates the SAT, especially for the small sets of questions Krell lets you choose.

Krell's math is terrifying. The questions seem to be from medium to hard, mostly hard (at least to me).

Example: WHAT IS THE LENGTH OF A LINE BETWEEN POINT A (5,-2) AND B (2,-4)?

Now look at Krell's explanation:

THE DISTANCE BETWEEN ANY TWO POINTS IS EQUAL TO THE SQUAREROOT (sic) OF THE SUM OF THE SQUARES OF THE DIFFERENCES OF THEIR X AND Y COORDINATES. (THE PYTHAGOREAN THEOREM)

IN THIS CASE: THE SQUAREROOT OF 13

That's no explanation, it's a death sentence! If you can understand their explanation, you obviously don't need one. The explanation ends with a question: "Do you want another question of this type?" Not a chance! And once again, you must look at your score.

Krell's little booklet contains reading selections and a few math-related diagrams. Neither program includes diagrams for the geometry questions on the disk.

WOULD THEY HELP?

These programs have two purposes: 1) get the student familiar with the SAT testing style. 2) increase the student's knowledge.

The HBJ package certainly familiarizes the student with the test, but at the cost of a huge time investment. And if these programs also intend to make the student feel more comfortable with the exam, I think Krell fails. It made me feel most uncomfortable, even ignorant.

HBJ's explanations in the verbal sections seemed to help increase knowledge. Their flashcard set did just that. But Krell's entire verbal sections were simple flashcards. With both, however, you won't get much help unless the word you studied appeared on the SAT—only *one* did on my last test.

HBJ's math sections could provide learning increases, especially if you studied the workbook. But Krell's math instruction was way beyond me.

You have to be really motivated to put up with either of these programs. The hours and hours of real work required to study are even more difficult to endure with both HBJ and Krell's built-in frustrations.

These are *serious* programs—no sound, no color, no special effects—just dry, unremitting drills. Be sure you're ready for this type of experience before you lay out any money.

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YOGA BREATHING

Your guru, the Atari

by LEN DORFMAN and JERRY WHITE

Your Atari can be used as a meditation tool for helping you learn to relax and fight stress. This BASIC program runs on all 8-bit Atari computers of any memory size, with disk or cassette.

Atari enthusiasts tend to believe that using their favorite computer makes them feel better. Now you can put this to the test! Use your trusty machine to help you learn the breathing techniques of pranayama yoga which—if done right—let you relax and fight the stress of the workaday world.

Before you RUN the Yoga Breathing program, (Listing 1, BREATHE.BAS, which needs to be typed in, checked with TYPO II and SAVEd), read this article to learn the basic yoga approach to breathing for relaxation.

HOW TO BREATHE

Within your chest are a heart and two lungs. Below that is the abdomen, separated by a flexible muscle called the diaphragm.

Breathing expands the lungs and draws air into your body. Oxygen is then extracted from the air and passed into your blood. Without sufficient oxygen you'll be sluggish, drowsy and lethargic. Thus, correct breathing requires drawing air into the lungs so that the greatest amount of blood receives oxygen.

Pushing your abdomen outward pulls the diaphragm down, expanding the lower lungs and creating a vacuum to draw air in. If you sit in an upright position, gravity will force more blood into the bottom of your lungs than into the middle or top.

With this type of breathing, called diaphragmatic, you get more air into your lower lungs—where there is more blood to carry oxygen through the body. This is the most efficient method of breathing.

Unfortunately, most people usually do chest breathing, which is not nearly as effective. In chest breathing you expand the ribs to aerate the central lungs. This is relatively inefficient because most of the air does not end up in the lower lungs where there is

more blood to carry oxygen through the body.

FINE CONTROL

When you've learned to breathe diaphragmatically, this computer program will help you master the fine control of your breathing process. People with respiratory diseases should consult their doctor before using this program.

With this fine control, a person who practices structured diaphragmatic breathing daily will gradually be able to produce the respiratory patterns associated with relaxed states of mind.

A good way to get started breathing diaphragmatically is to try this exercise: Lie flat on your back. Put one hand on your abdomen and the other on your chest. Keep your mouth closed for all breathing exercises and breathe exclusively through your nose. When you inhale, push your abdomen out and try to keep your chest from moving. When you exhale relax the muscles you used to push your abdomen out.

If you are breathing diaphragmatically, the hand on your abdomen will rise and fall as you breathe, while the hand on your chest remains steady.

Now would be a good time to try a simple relaxation procedure. Find a quiet dimly-lit space in your abode. Lie flat on your back, close your eyes and begin breathing in a gentle, relaxed, diaphragmatic fashion. When you inhale, imagine clean, fresh, vitalizing air entering your body. When you exhale, imagine that all your muscular tensions are leaving with your breath. Try it!

The next step is to try that same two-handed breathing exercise in a straight-back chair. You may discover that your exhalation in this position might not seem as complete as when you were lying flat. The reason is that when you are flat on your back, gravity will aid your exhaling. But when you're sitting upright, the motion of your abdomen is horizontal.

USING THE PROGRAM

RUNning the Yoga Breathing program, you'll see the word PRANAYAMA at the top of the screen. This is the Sanskrit word denoting certain yoga breathing practices. Below this, you'll see the following parameters: SOUND, COUNT, INHALE, RETAIN, and EXHALE. As you are modifying any of the parameters, they will appear in double height letters.

Place a joystick in port 1. Stick up or down moves between parameters. Stick left and right will change the value of the parameter.

The sound feature gives you audible cues to time your breathing cycle. But at first, you'll want to use both the screen and sound prompts to cue your breathing. So leave the SOUND on. Next highlight COUNT and set the value to 10. Change INHALE to 4, RETAIN to 0, and EXHALE to 4. When these values are set, press the joystick trigger.

The program will display the word INHALE for approximately 4 seconds, RETAIN will be bypassed, and EXHALE will be displayed for 4 seconds.

MASTER THE FINE CONTROL OF YOUR BREATHING PROCESS

The cycle will repeat ten times. While the program is running you can sit with a relaxed straight back and begin timing your diaphragmatic breathing to the program. This current set-up will allow for approximately 80 seconds of practice (10 * [4 + 4] = 80).

Once you've gotten the hang of using the program, set COUNT to 40. Again begin diaphragmatic breathing and press the trigger. Follow the cues of the program, remembering to breathe through your nose in an even fashion. There should be no pauses or jerkiness in the breathing.

Yogis place great value on the relation between inhalation, retention and exhalation cycles. Try starting at 4 seconds for the inhale, 0 seconds for the retain, and 4 seconds for the exhalation. Notice that the relationship of the inhale, retain, and exhale is 1,0,1. That is a traditional beginning formula.

As you begin to become comfortable with the breathing practice you might want to gradually slow your inhale and exhale to 10 seconds for each. A summary of some breathing patterns is listed in the table below.

INHALE	RETAIN	EXHALE
1	0	1
1	0	2
1	1	1
1	1	2
1	2	2
1	4	2

The bottom four relationships are for advanced yoga students and should not be attempted without instruction from a competent Yoga instructor.

In a world filled with pressure it is useful to develop skills that help shield ourselves from the potential ravages of stress. If your breathing session goes well you will most likely feel more relaxed afterward.

For further reading, I warmly recommend *The Science of Breath* by Swami Rama, R. Ballentine, M.D. and A. Hymes, M.D., published by the Himalayan Institute of Yoga Science and Philosophy.

*High school teacher Len Dorfman is a rarity—a professional, speedy machine language programmer who never really learned BASIC. He originally submitted this program to **Antic** as a lengthy, hard-to-type assembler listing. So for a smooth BASIC conversion, we suggested that Len get together with his fellow Long Islander, **Antic** Contributing Editor Jerry White.*

Listing on Page 56

GRAPH 3D

Spectacular three-dimensional visuals!

by PAUL CHABOT

Explore the world of visual calculus and create three-dimensional graphs from mathematical functions. This BASIC program will run on all Atari computers with 48K memory and a disk drive.

If you've seen the fantastic, computer-generated landscapes in movies such as "The Last Starfighter," you know what a three-dimensional graph looks like. Graph 3D creates three-dimensional objects in Graphics Mode 8, based upon functions of the form: Z=f(X,Y). Your landscapes, or objects will not be solid, but you can alter the density of the graph lines.

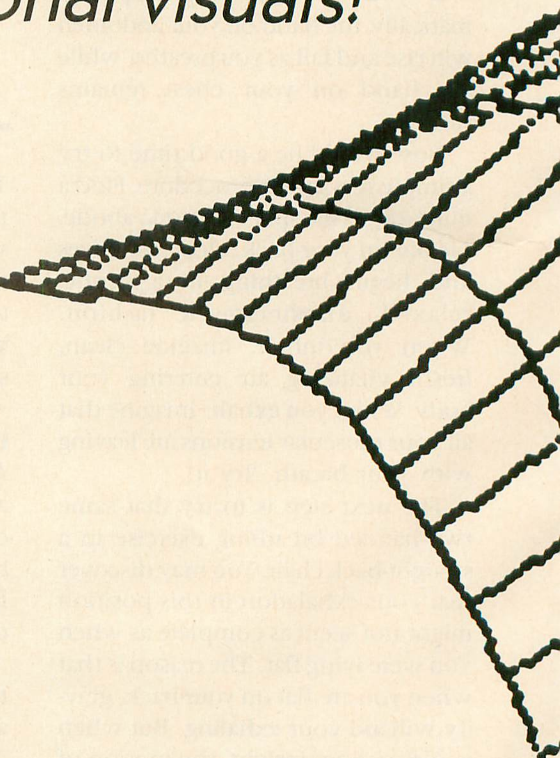
The second part of this article will cover technical details, but you don't need a degree in calculus to create shapes with Graph 3D. Here's how to get it up and running.

GETTING STARTED

Type in Listings 1 and 2 and check them with TYPO II. There's some machine language in these programs, so make sure that your TYPO II codes are correct and that you haven't left out any lines. SAVE Listing 1 as GR3DLOAD.BAS. Since Listing 1 automatically runs Listing 2, be sure and SAVE Listing 2 as GRAPH3D.BAS and don't try to run GRAPH3D.BAS by itself. Those using **Antic's** DISKIO (January, 1985) should boot these programs without it.

Run the program GR3DLOAD.BAS. First a title and then a menu will appear. After a brief pause, a black graphics screen will take its place and begin drawing a sample graph. When the graph is completed, the menu will return. You can switch between the menu and the graphics screen by pressing [SPACE]. The commands on the menu are single letter options which can be used from either the screen or the menu. Choose a command option by pressing the letter with no [RETURN].

For example, let's SAVE the picture that's currently on the screen. Be sure there's a disk with 62 free sectors in Drive 1. Type [S] and, at the prompt, type in the filename and then press [RETURN] and answer [Y]. You don't need the D: device prefix and Graph 3D will automatically add an extender of .G3D. For the technically oriented, Graph 3D files are straight Graphics 8+16 picture files consisting



of 7680 bytes of screen data followed by 13 records containing parameter information. (See lines 910-918.)

ENTERING A FUNCTION

Let's type in a function without worrying about why it works. (We'll save that for later.) Get to the menu by pressing [SPACE], if you're not already there. Type [F] for function. You should see the current function and under it, **Z=**. Now type **1-2*Y*Y** and press [RETURN]. Next, type [E] for eye placement, then type **10,10,5** [RETURN]. Set the magnification to 120 by typing [M] [120] [RETURN]. Center the graph by typing [C] [160] [RETURN] [30] [RETURN]. Finally, type [I] and enter **-2,2,-1,1** [RETURN].

Now, to graph the object to the screen, press [G]. Parts of the menu will flash and you'll see the message "Computing Points." The graphics screen will then appear and begin drawing an object that should end up looking like a trellis tunnel.

ALTERED STATES

Many of the menu choices in GRAPH 3D alter the view of the displayed object. In most cases, you must press [G] to redraw the object using the new values. The best way to understand any of the commands is to try different values, press [G], then examine the results.

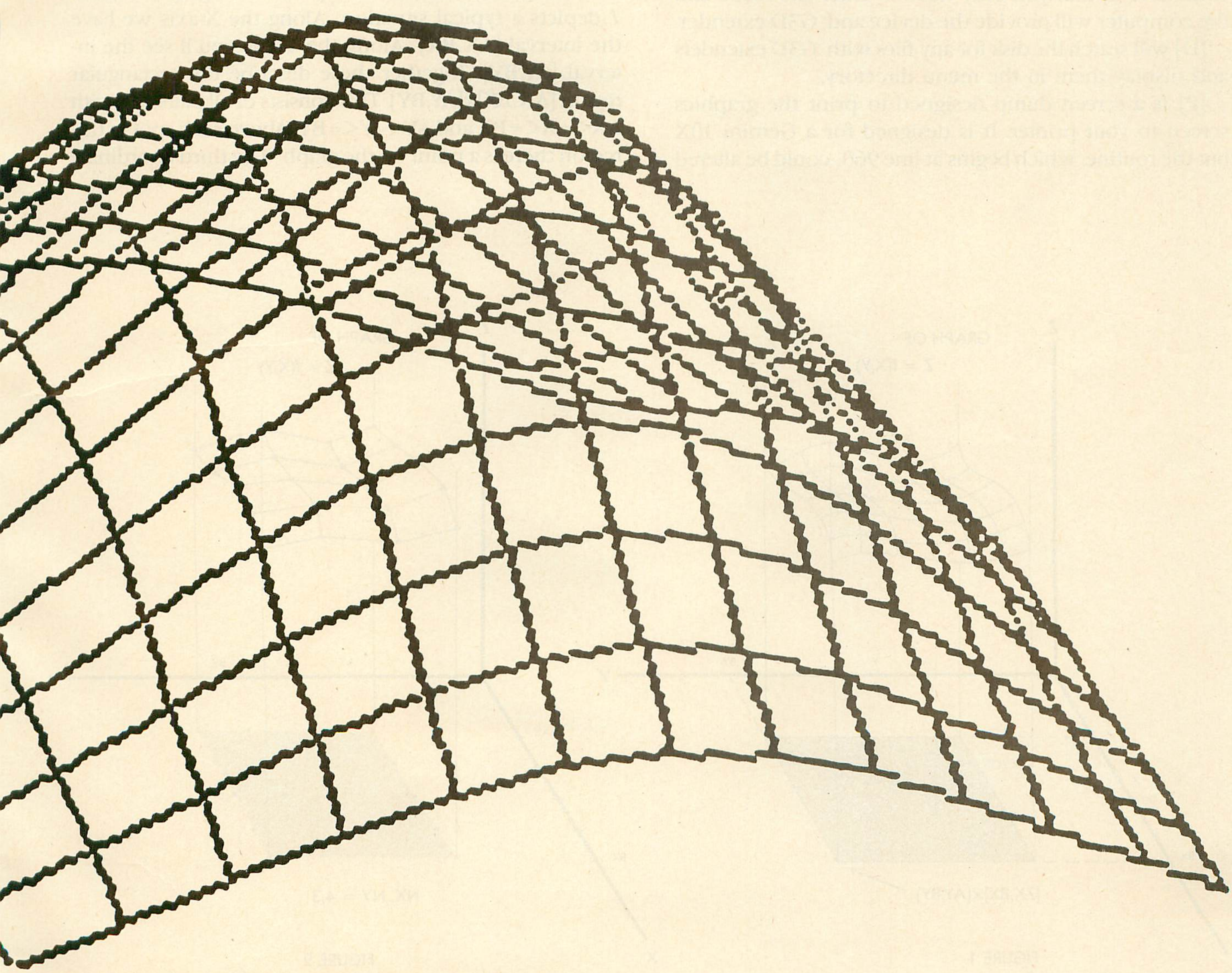
Our example shows [M] will change the magnification of the graph and [C] will shift it on screen by entering new X and Y coordinates based upon the usual screen grid where 0,0 is the upper left corner.

[E] is the eye location in three-dimensional space. Place a square grid on the floor and the two directions of the grid are X and Y. A pole running perpendicular from the floor is the Z axis, and the three values entered are in order: X,Y,Z.

You can change the number of X and Y cross-grid lines with [N]. High values give more detail to the surface but require more computing time. The maximum value allowed is 24.

[O] when pressed, increments the graphing option. Various features of the surface can be accentuated by showing some cross-sections and not others. The options are:

continued on next page



0—all available cross-sections graphed.

1—all X sections, only first and last Y section.

2—all Y sections, only first and last X section.

3—all X sections, every third Y section.

4—all Y sections, every third X section.

5—every third cross-section.

If you wish to alter these options, see lines 306–318 and 522.

The two intervals defining the rectangular region under the graph can be altered with [I]. These will show up in square brackets on the screen, but should be entered in order AX,BX,AY,BY.

[F] permits you to enter a new function. If your object ends up a complete mess, have no fear! Press [R] and you may restore your previous graph which has been saved in memory.

[R] will also work after a graph file has been loaded with the [L] command. The [L] command, which loads a previously saved picture file, is similar to the [S] save command in that you only need to enter the name and the computer will provide the device and .G3D extender.

[D] will search the disk for any files with .G3D extenders and display them in the menu directory.

[P] is a screen dump designed to print the graphics screen to your printer. It is designed for a Gemini 10X but the routine, which begins at line 960, could be altered for your own printer. *(For a much faster screen dump that will work on various printers and can be used with Graph 3D files, see "Kwik Dump" by Jerry Allen, **Antic**, March, 1985* —ANTIC ED.)

TECHNICAL INFO

Each point (P) in three-dimensional space is determined by a "triple" (X,Y, and Z coordinates). The first two coordinates specify a spot in the usual X,Y plane, which is visualized as lying on the floor. The third coordinate gives the distance of P above or below this spot. *Figure 1* shows the usual orientation of the three axes.

The graph of a function Z=f(X,Y) is the collection of all triples, where the third coordinate, Z, is computed from the first two using the function f. For example, the graph of Z=X*X+Y*Y contains points like (1,1,2), (2,3,13), (-1,2,5) since each of these satisfy the equation. Specifically, the third coordinates are all obtained from the first two by using the rule Z=X*X+Y*Y. Such graphs are visualized as surfaces in three-dimensional space.

Obviously we cannot draw the entire graph of a function. Graph 3D sketches only portions of graphs. *Figure 1* depicts a typical situation. Along the X-axis we have the interval [AX,BX]. Along the Y-axis you'll see the interval [AY,BY]. Together these describe the rectangular region [AX,BX]x[AY,BY]. This consists of all pairs X,Y with AX<=X<=BX and AY<=Y<=BY. Above each spot in this region there is a point on the graph. The third coordinate

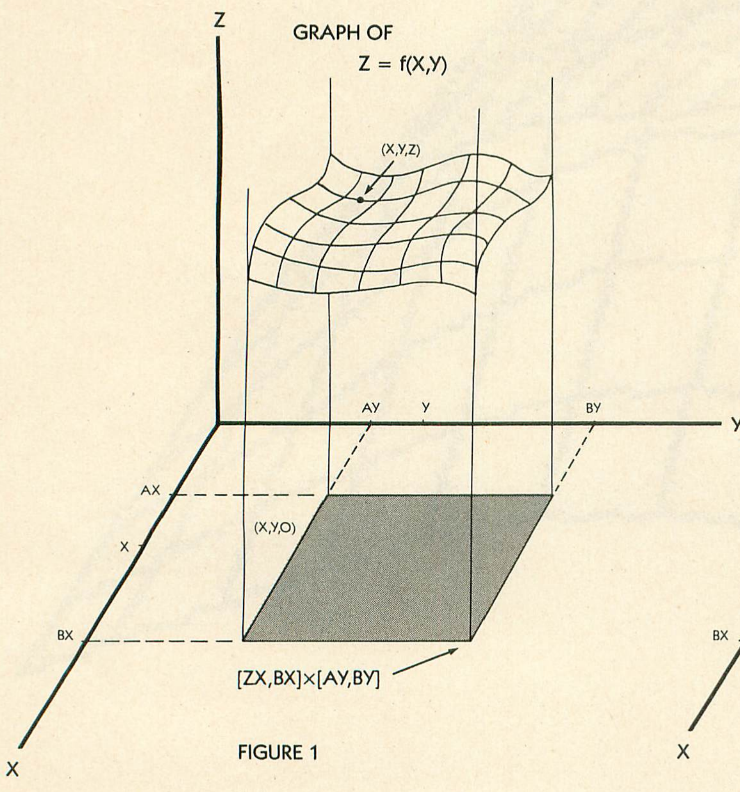


FIGURE 1

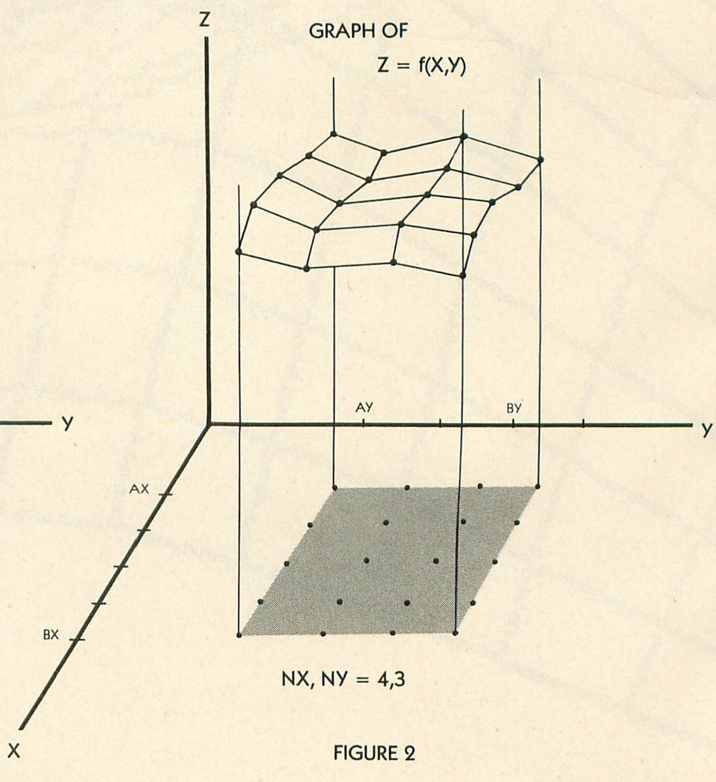


FIGURE 2

Z is found by evaluating f(X,Y). It is also clear that we can't do this for every possible X,Y in the region.

This is where the partition sizes NX,NY come into play. *Figure 2* shows a 4,3 partitioning. With NX=4 the interval [AX,BX] along the X-axis is broken into 4 equal pieces (subintervals). Whereas the Y-axis interval [AY,BY] is split into 3 subintervals. This leads to 20 spots of interest in the rectangular region. The function f(X,Y) is then computed at each of these, resulting in 20 data points actually on the graph. We now connect these with line segments to get a rough idea of the shape of the graph.

Larger values of NX,NY will give you a better looking picture but will take more time. Also, if you plot too many data points and joining line segments, your picture can quickly become cluttered. This is solved with the graphing options [O].

FUNCTIONS TO TRY

To get you started here's a list of functions with suggested rectangular domain and eye location. When you build up the courage to try your own just be careful to avoid the "value error" trap. Be sure that the function you use is defined on the entire rectangular region. Graph 3D will accept each of the following examples. Use the menu selections [F], [I], and [E] to input the data.

1. Z=1-2*X*X
[-2,2]x[-1,1] eye:10,10,5

2. Z=X*X+2*Y*Y
[-1,1]x[-1,1] eye:10,14 4

3. Z=SIN(3*X)
[-1,1]x[-1,1] eye:10,15,12

4. Z=SQR(X*X+3*Y*Y)
[-3,3]x[-1,1] eye:10,2,3

5. Z=EXP(-X*X-Y*Y)
[-2,2]x[-1,1] eye:4,10,3

6. Z=4*X*X*X*X-4*X*X+Y*Y
[-1,1]x[-1,1] eye:10,17,4

7. Z=1/(0.5+X*X+Y*Y)-1/(0.5+X*X+(Y-2)*(Y-2))
[-2,2]x[-2,4] eye:20,10,10

8. Z=COS(3*X*Y)
[-1,1]x[-2,2] eye:20,10,40

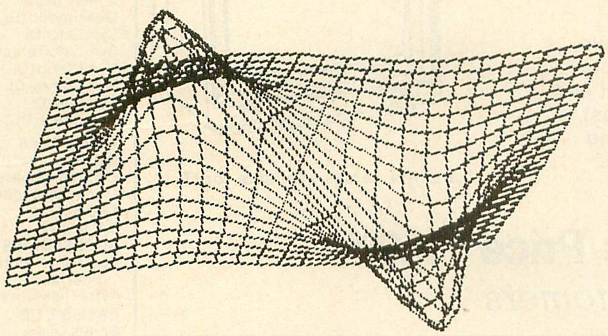
9. EXP(SIN(X*Y))
[-3,3]x[-3,3] eye:10,20,30

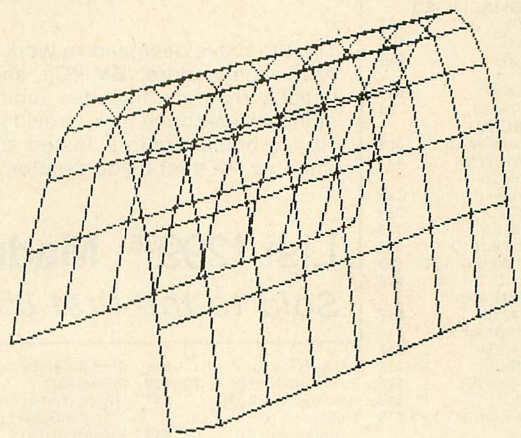
10. Z=X*X*X+2*Y*Y*Y
[-1,1]x[-1,1] eye:10,10,5

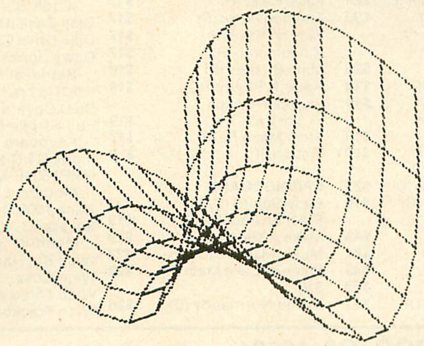
You'll find the 3D graphs of some of these functions illustrating the article. If you create an impressive new function, be sure to send it to **Antic** as an I/O Board letter.

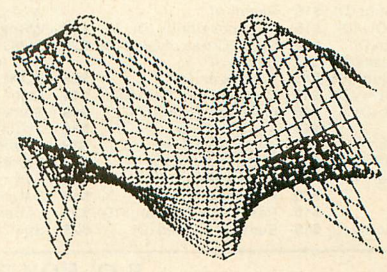
Paul Chabot, professor of mathematics and computer science at California State University, Los Angeles, returns to BASIC here after publishing ACTION! graphics programs in the April and June, 1985 issues of ***Antic****.*

Listing on page 57









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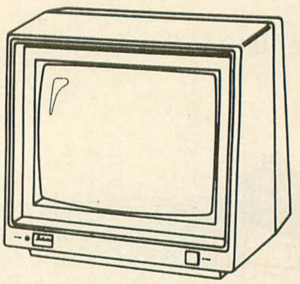
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Antic type-in listing section includes every full-length program from this issue. Listings are easier to type and proofread, easy to remove and save in a binder if you wish.

DISK SUBSCRIBERS: You can use all these programs immediately. Just follow the instructions in the accompanying magazine articles.

Antic program listings are typeset on the Star's SG-10 printer—from Star Micronics, Inc., 200 Park Avenue, New York, NY 10166.

TYPING SPECIAL ATARI CHARACTERS

Antic printed program listings leave a small space between each Atari Special Character for easier reading. Immediately below you will see the way **Antic** prints all the standard Atari letters and numbers, in upper and lower case, in normal and inverse video.

ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
abcdefghijklmnopqrstuvwxyz
0123456789 0123456789

The Atari Special Characters and the keys you must type in order to get them are shown in the two boxes below. (Squares are drawn around the normal video characters so you can see their positions more accurately, these squares will not appear in listings.)

NORMAL VIDEO

FOR THIS	TYPE THIS	FOR THIS	TYPE THIS
	CTRL ,		CTRL T
	CTRL A		CTRL U
	CTRL B		CTRL V
	CTRL C		CTRL W
	CTRL D		CTRL X
	CTRL E		CTRL Y
	CTRL F		CTRL Z
	CTRL G		ESC ESC
	CTRL H		ESC CTRL –
	CTRL I		ESC CTRL =
	CTRL J		ESC CTRL +
	CTRL K		ESC CTRL *
	CTRL L		CTRL .
	CTRL M		CTRL ;
	CTRL N	|	SHIFT =
	CTRL O		ESC SHIFT CLEAR
	CTRL P		
	CTRL Q		
	CTRL R		ESC DELETE
	CTRL S		ESC TAB

INVERSE VIDEO

FOR THIS	TYPE THIS	FOR THIS	TYPE THIS
	⅄CTRL ,		⅄CTRL Y
	⅄CTRL A		⅄CTRL Z
	⅄CTRL B		ESC SHIFT DELETE
	⅄CTRL C		
	⅄CTRL D		
	⅄CTRL E		ESC SHIFT INSERT
	⅄CTRL F		
	⅄CTRL G		
	⅄CTRL H		ESC CTRL TAB
	⅄CTRL I		
	⅄CTRL J		
	⅄CTRL K		ESC SHIFT TAB
	⅄CTRL L		
	⅄CTRL M		
	⅄CTRL N		⅄CTRL .
	⅄CTRL O		⅄CTRL ;
	⅄CTRL P		⅄SHIFT =
	⅄CTRL Q		ESC CTRL 2
	⅄CTRL R		ESC CTRL DELETE
	⅄CTRL S		
	⅄CTRL T		
	⅄CTRL U		ESC CTRL INSERT
	⅄CTRL V		
	⅄CTRL W		
	⅄CTRL X		

Whenever the CONTROL key (CTRL on the 400/800) or SHIFT key is used, *hold it down* while you press the next key. Whenever the ESC key is pressed, *release* it before you type the next key.

Turn on inverse video by pressing the Reverse Video Mode Key. Turn it off by pressing it a second time. (On the 400/800, use the Atari Logo Key instead.) Note: In the printed listings, inverse characters will be slightly smaller than the normal ones.

Among the most common program typing mistakes are switching certain capital letters with their lower-case counterparts—you need to look especially carefully at P, X, O and 0 (zero).

Some of Atari Special Characters are not easy to tell apart from standard alpha-numeric characters. Usually the Special Characters will be *thicker* than the alpha-numerics. Compare the two sets of characters below:

SPECIAL		STANDARD	
	CTRL F		/
	CTRL G		SHIFT +
	CTRL N		SHIFT -
	CTRL R		-
	CTRL S		+

HOW TO USE TYPO II

TYPO II is the improved automatic proofreading program for **Antic's** type-in BASIC listings. It finds the exact line where you made a program typing mistake.

Type in TYPO II and SAVE a copy to disk or cassette. Now type GOTO 32000. When you see the instruction on the screen, type in a single program line **without the two-letter TYPO II code** at left of the line number. Press [RETURN].

Your line will reappear at the bottom of the screen with a two-letter TYPO II code on the left. If this code is not exactly the same as the line code printed in the magazine, you mistyped something in that line.

To call back any line previously typed, type an asterisk [*] followed (without in-between spaces) by the line number, then press [RETURN]. When the complete line appears at the top of the screen, press [RETURN] again. This is also the way you use TYPO II to proofread itself.

To LIST your program, press [BREAK] and type LIST. To return to TYPO II, type GOTO 32000.

To remove TYPO II from your program, type LIST "D:FILENAME",0,31999 [RETURN] (Cassette owners LIST "C:). Type NEW, then ENTER "D:FILENAME" [RETURN] (Cassette—ENTER "C:). Your program is now in memory without TYPO II and you can SAVE or LIST it to disk or cassette.

Owners of the BASIC XL cartridge from O.S.S. type SET 5,0 and SET 12,0 before using TYPO II.

Don't type the TYPO II Codes!

```
WB 32000 REM TYPO II BY ANDY BARTON
VM 32010 REM VER. 1.0 FOR ANTIC MAGAZINE
HS 32020 CLR :DIM LINE$(120):CLOSE #2:CLO
   SE #3
BN 32030 OPEN #2,4,0,"E":OPEN #3,5,0,"E"
YC 32040 ? "K":POSITION 11,1:? "TYPO II"
EM 32050 TRAP 32040:POSITION 2,3:? "Type
   in a program line"
HS 32060 POSITION 1,4:? " ":INPUT #2;LINE
   $:IF LINE$="" THEN POSITION 2,4:LIST B
   :GOTO 32060
XH 32070 IF LINE$(1,1)="*" THEN B=VAL(LIN
   E$(2,LEN(LINE$))):POSITION 2,4:LIST B:
   GOTO 32060
TH 32080 POSITION 2,10:? "CONT"
MF 32090 B=VAL(LINE$):POSITION 1,3:? " ";
NY 32100 POKE 842,13:STOP
CN 32110 POKE 842,12
```

Don't type the TYPO II Codes!

```
ET 32120 ? "K":POSITION 11,1:? " TYPO II 
   ":POSITION 2,15:LIST B
CE 32130 C=0:ANS=C
QR 32140 POSITION 2,16:INPUT #3;LINE$:IF
   LINE$="" THEN ? "LINE ";B;" DELETED":G
   OTO 32050
VV 32150 FOR D=1 TO LEN(LINE$):C=C+1:ANS=
   ANS+(C*ASC(LINE$(D,D))):NEXT D
WJ 32160 CODE=INT(ANS/676)
JW 32170 CODE=ANS-(CODE*676)
EH 32180 HCODE=INT(CODE/26)
BH 32190 LCODE=CODE-(HCODE*26)+65
HB 32200 HCODE=HCODE+65
IE 32210 POSITION 0,16:? CHR$(HCODE);CHR$
   (LCODE)
VG 32220 POSITION 2,13:? "If CODE does no
   t match press RETURN and edit line a
   bove.":GOTO 32050
```

ERROR FILE

GUESS THAT SONG

July 1985

The September, 1985 HELP! section contains an easier-reading listing of some of the tougher data lines in Guess That Song.

MUSICIAN

June 1985

Change line 790 to:

```
790 IF A=54 THEN
POSITION 4,22:? #
6;"song cleared":
GOTO 810
```

MANEUVER

April 1985

If you get hearts on the title screen, LIST the program to disk or cassette, type NEW, then ENTER and SAVE it.

FONT MAKER FOR SG-10

March 1985

The July 1985 issue of ANTIC contains a listing which, when merged with FONT MAKER, makes that program work on the Star SG-10. See the HELP section of that issue for instructions.

KWIK DUMP

March 1985

The last number in line 1070 should be 27 instead of zero.

KOOKY'S QUEST

February 1985

The following line is missing:

2100 FOR S=32 TO 16 STEP -4: SOUND 0,S,14,10: EA=EA*EA*EA: SOUND 0,0,0,0: EA=1∧0:NEXT S

WIDE TEXT

January 1985

Substitute the following lines to print wide Z's.

In assembly:

```
0600       CPY #27*
8   ;8 BYTES TO A
 LETTER
```

In BASIC:

```
CT 20130 DATA 216
,208,213,185,0,22
4
```

ADVENT X-5

November 1984

Missing line: 8020 RUN. Also, cassette owners should change the 138 in line 4005 to 130. The TYPO II code for line 1005 is EJ.

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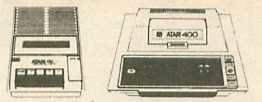
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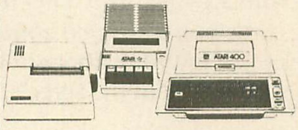
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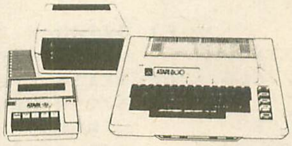
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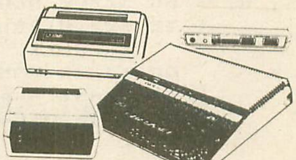
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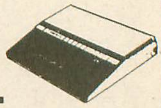
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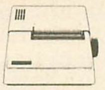


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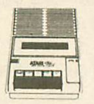


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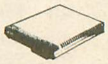
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BANJO PICKER

Article on page 28

LISTING 1

Don't type the TYPO II Codes!

```
HH 10 REM BANJO PICKER
QT 20 REM BY R.K.LINDGREN
FW 30 REM (c) 1985, ANTIC PUBLISHING
ID 40 DIM SC(22),PK(11,8),PL(13,5),SIMUL$
   (16),A$(30),CN$(39),KB(63)
NG 50 GOTO 320
AI 60 REM PICK ROUTINE
JH 70 PS=PK(PP,I):N=PL(P,PS):ST1=ST-40*PS
   :POKE ST1,96:ON J GOTO 80,90,100,110
HC 80 F1=N:X=USR(U,F1,C1,F4,C2,F3,C3,F2,C
   4):GOTO 120
HU 90 F2=N:X=USR(U,F2,C1,F1,C2,F4,C3,F3,C
   4):GOTO 120
PG 100 F3=N:X=USR(U,F3,C1,F2,C2,F1,C3,F4,
   C4):GOTO 120
LJ 110 F4=N:X=USR(U,F4,C1,F3,C2,F2,C3,F1,
   C4)
TM 120 J=J+1:IF J>4 THEN J=1
DB 130 I=I+1:IF I>PN THEN I=1
GT 140 FOR X=1 TO W:NEXT X
UX 150 IF PEEK(SKEY)<>7 THEN 270
FN 160 REM START KEY, CHECK KEYBOARD
GQ 170 POKE ST1,0
QB 180 X=PEEK(764):IF X=LST THEN 70
SV 190 IF X>63 THEN X=LST:GOTO 70
VH 200 Q=KB(X)
GI 210 REM NEW CHORD
XU 220 IF Q>0 THEN LST=X:P=Q:P2=P*3:P1=P2
   -2:POSITION 14,0:? CN$(P1,P2):GOTO 180
BA 230 REM NEW PICK PATTERN
FV 240 IF Q<0 THEN LST=X:PP=-Q:POSITION 2
   7,0:? PP;" ":GOTO 180
RV 250 GOTO 70
NI 260 REM CHECK OPTION & SELECT
YQ 270 IF PEEK(SKEY)=3 THEN W=INT(W/2)+1:
   GOTO 170
CT 280 IF PEEK(SKEY)=5 THEN W=W+5:GOTO 17
   0
HN 290 IF PEEK(SKEY)=6 THEN FOR II=0 TO 3
   :SOUND II,0,0,0:NEXT II:POKE ST1,0:GOT
   O 640
OH 300 GOTO 170
MW 310 REM INITIALIZATION
DJ 320 GRAPHICS 0:POKE 752,1:? "      (Tun
   ing, please wait)"
BT 330 POKE 710,4:POKE 712,4:POKE 709,2
AF 340 POSITION 6,2:POKE 82,6
LP 350 FOR I=1 TO 7:READ A$:? A$(2):NEXT
   I
GA 360 ? :? "PRESS OPTION TO SPEED UP":?
   "PRESS SELECT TO SLOW DOWN"
ID 370 ? "PRESS START  TO START & STOP"
QN 380 REM READ SOUND POKE ROUTINE
DO 390 FOR I=1 TO 16:READ X:SIMUL$(I)=CHR
   $(X):NEXT I
RE 400 REM READ SOUND PARAMETERS
GQ 410 FOR I=1 TO 22:READ X:SC(I)=X:NEXT
   I
AR 420 FOR I=1 TO 63:KB(I)=0:NEXT I
CB 430 REM READ CHORDS
CY 440 CN$=" ":CN$(39)=" ":CN$(2)=CN$:REA
   D CC
SP 450 FOR I=1 TO CC:READ X:KB(X)=I:FOR J
   =1 TO 5:READ X:PL(I,J)=SC(X):NEXT J:RE
   AD A$
QY 460 P1=I*3-2:CN$(P1,P1+LEN(A$)-1)=A$:N
   EXT I
LU 470 KB(47)=2:KB(63)=5:KB(23)=8
MP 480 REM READ PICK PATTERNS
ZV 490 READ PP:FOR I=1 TO PP:READ X:KB(X)
   =-I:FOR J=1 TO 8:READ X:PK(I,J)=X:NEXT
    J:NEXT I
MW 500 REM DISPLAY CHORD NAMES
LP 510 POKE 82,2:? :? "    CHORDS:
   PICK PATTERNS:"
WR 520 POKE 710,14:POKE 712,14
AQ 530 ? :? "1  2  3  4               7  8  9
   0"
ZL 540 ? CN$(1,12):? "
   U  I  O  P":? " ";CN$(4,6);CN$(13,21)
NW 550 ? "                    J  K  L":?
   "   ";CN$(13,15);CN$(22,30)
ZQ 560 ? :? "     ";CN$(22,24);CN$(31,39);:
   REM DON'T FORGET THIS SEMI-COLON
LY 570 C1=167:C2=164:C3=162:C4=161
BC 580 P=5:PP=1:W=100
WW 590 P2=P*3:P1=P2-2:PN=8
EB 600 U=ADR(SIMUL$):F1=0:F2=0:F3=0:F4=0:
   LST=255:SKEY=53279
MX 610 POSITION 7,0:? "CHORD: ";CN$(P1,P2
   );" PATTERN: ";PP
CL 620 ST=PEEK(560)+256*PEEK(561)+356
LG 630 REM WAIT FOR START KEY OFF THEN ON
VY 640 IF PEEK(SKEY)<>7 THEN 640
WI 650 IF PEEK(SKEY)<>6 THEN 650
MC 660 FOR X=1 TO 25:NEXT X
MX 670 POKE SKEY,8
ZU 680 I=1:J=1:GOTO 70
QW 690 DATA "      ◆
EG 700 DATA "┬─┬─┬┘           ◆  ◆
TE 710 DATA "┼─┼─┼─┬─┬─┬─┬──┴──┴─┐
SE 720 DATA "┼─┼─┼─┼─┼─┼─┤Banjo |
FP 730 DATA "┼─┼─┼─┼─┼─┼─┤Picker|
ZQ 740 DATA "┴─┴─┴─┴─┴─┴─┴──┬──┬─┘
XZ 750 DATA "                 ◆  ◆
YU 760 REM SOUND POKE ROUTINE
HH 770 DATA 104,133,203,162,0,104,104,157
   ,0,210,232,228,203,208,246,96
VG 780 REM SOUND FREQ. VALUES
LD 790 DATA 243,230,217,204,193,182,173
EM 800 DATA 162,153,144,136,128,121,114,1
   08,102,96,91,85,81,76,72
PF 810 REM CHORD DATA
IR 820 DATA 13
GW 830 DATA 31,18,13,10,6,20,F
IT 840 DATA 30,17,13,8,5,20,C
SJ 850 DATA 26,18,12,8,3,20,G7
OU 860 DATA 24,17,13,10,5,20,Am
MO 870 DATA 46,15,12,8,3,20,G
JB 880 DATA 42,15,13,10,3,20,D7
UB 890 DATA 40,17,12,8,5,20,Em
IW 900 DATA 62,19,15,10,7,20,D
LU 910 DATA 58,17,14,10,5,20,A7
ZC 920 DATA 56,19,15,12,7,22,Bm
CY 930 DATA 22,17,14,10,5,22,A
ST 940 DATA 18,17,15,12,5,22,E7
PQ 950 DATA 16,19,14,10,7,22,F#m
LT 960 REM PICK PATTERNS
IG 970 DATA 11
HZ 980 DATA 51,3,2,5,1,4,2,5,1
EW 990 DATA 53,3,2,1,5,1,2,3,1
JZ 1000 DATA 48,3,1,5,3,1,3,4,1
HB 1010 DATA 50,3,2,1,5,3,1,5,1
GO 1020 DATA 11,3,1,5,3,1,5,3,1
```

continued on next page

```
GJ 1030 DATA 13,2,1,2,1,5,2,1,5
JP 1040 DATA 8,1,2,3,1,5,2,1,5
EH 1050 DATA 10,1,2,5,1,2,5,2,1
FG 1060 DATA 1,1,2,1,5,1,2,1,5
MH 1070 DATA 5,3,5,3,1,5,3,1,5
CJ 1080 DATA 0,2,3,2,1,2,3,2,1
```

your guru, the Atari

YOGA BREATHING

Article on page 44

LISTING 1

Don't type the TYPO II Codes!

```
HU 1 REM BREATHE
WT 2 REM BY LEN DORFMAN AND JERRY WHITE
FD 3 REM (c) 1985, ANTIC PUBLISHING
VI 10 GOSUB 7000:GOTO 100
KG 30 REM ONE SECOND SUBROUTINE
YN 40 IF SFLG THEN SOUND 0,PITCH,2,8
ZS 50 POKE 709,15:POSITION 6,21:? #6;PHAS
   E$:REM WHITE COMMAND DISPLAY
LR 60 SOUND 0,0,0,0:FOR TICK=1 TO SECS:PO
   KE 540,59:REM APPROX 1 SEC COUNTDOWN
FR 62 IF TICK<>SECS THEN 70:REM NOT LAST
   SEC
YE 64 WAIT=PEEK(540):IF WAIT>15 THEN 64
XB 66 POKE 709,WAIT:IF WAIT THEN 64:REM F
   ADE COMMAND COLOR
WG 68 NEXT TICK:RETURN
QZ 70 IF PEEK(540) THEN 70:REM COUNTDOWN
   INCOMPLETE SO LOOP HERE
KR 80 GOTO 68:REM DO IT AGAIN
FY 95 REM RESET DISPLAY
QX 100 OFS=10:OLD=10:POKE DL+10,7
IC 102 REM RESET COLORS AND TURN ON SCREE
   N
QX 105 POKE 712,160:POKE 710,156:POKE 709
   ,160:POKE 708,28:POKE 711,188:POKE 559
   ,34
YM 108 REM JOYSTICK UPDATE
TC 110 JS=STICK(0):IF  NOT STRIG(0) THEN
   800:REM TRIGGER PRESSED
RK 115 IF JS=15 THEN 110:REM NOTHING TO D
   O
BG 120 IF JS=13 THEN OLD=OFS:OFS=OFS+3:IF
    OFS=25 THEN OFS=10:REM STICK DOWN
EG 140 IF JS=14 THEN OLD=OFS:OFS=OFS-3:IF
    OFS=7 THEN OFS=22:REM STICK UP
FM 160 IF JS<>7 AND JS<>11 THEN 300:REM S
   TICK NOT LEFT OR RIGHT
TG 170 B$="  ":REM CLEAR WORK STRING
LJ 180 IF JS=7 THEN GOTO 500+OFS:REM STIC
   K RIGHT
XL 200 GOTO 600+OFS:REM JS=11 STICK LEFT
TU 250 REM SCREEN UPDATE AND NOISE
SK 300 POKE DL+OLD,6:POKE DL+OFS,7:REM OL
   D LINE SMALL, NEW LINE BIG
QW 350 REM AUDIO FEEDBACK & DELAY
LZ 400 SOUND 0,OFS*2,10,8:JIF=20
ZN 405 POKE 540,JIF:SOUND 1,0,0,0:SOUND 0
   ,0,0,0
XY 410 IF PEEK(540) THEN 410
ML 415 GOTO 110
SQ 420 REM ERROR NOISE
EZ 430 FOR VOL=15 TO 0 STEP -0.5:SOUND 0,
   102,12,VOL:SOUND 1,51,12,VOL:NEXT VOL
SO 440 JIF=30:GOTO 405
FJ 500 REM VALIDITY CHECK & UPDATE
OW 510 IF S$(12,14)=" ON" THEN 430
NZ 511 S$(12,14)=" ON":GOTO 700
UC 513 IF COUNT=99 THEN 430
KG 514 COUNT=COUNT+1:GOTO 713
JQ 516 IF INHALE=60 THEN 430
WL 517 INHALE=INHALE+1:GOTO 716
RJ 519 IF RETAIN=60 THEN 430
OK 520 RETAIN=RETAIN+1:GOTO 719
LM 522 IF EXHALE=60 THEN 430
XM 523 EXHALE=EXHALE+1:GOTO 722
JW 610 IF S$(12,14)="OFF" THEN 430
FN 611 S$(12,14)="OFF":GOTO 700
PA 613 IF COUNT=1 THEN 430
LN 614 COUNT=COUNT-1:GOTO 713
AU 616 IF  NOT INHALE THEN 430
XW 617 INHALE=INHALE-1:GOTO 716
LZ 619 IF  NOT RETAIN THEN 430
PV 620 RETAIN=RETAIN-1:GOTO 719
DU 622 IF  NOT EXHALE THEN 430
YX 623 EXHALE=EXHALE-1:GOTO 722
CT 700 GOSUB 9000:GOTO 405
BC 710 REM UPDATE SCREEN STRING S$
FQ 713 S$(73,74)=B$:B$=STR$(COUNT):LB=LEN
   (B$):S$(75-LB,74)=B$:GOTO 700
CX 716 S$(133,134)=B$:B$=STR$(INHALE):LB=
   LEN(B$):S$(135-LB,134)=B$:GOTO 700
CS 719 S$(193,194)=B$:B$=STR$(RETAIN):LB=
   LEN(B$):S$(195-LB,194)=B$:GOTO 700
YI 722 S$(253,254)=B$:B$=STR$(EXHALE):LB=
   LEN(B$):S$(255-LB,254)=B$:GOTO 700
YV 790 REM SETUP FOR BREATH CYCLE
YQ 800 POKE DL+OFS,6:REM MAKE LARGE LINE
   SMALL
XZ 801 SFLG=0:IF S$(13,14)="ON" THEN SFLG
   =1:REM SET SOUND FLAG
NT 802 POKE 711,164:POKE 710,164:POKE 708
   ,164:POKE 712,0:REM RESET COLORS
YB 803 REM BREATH CYCLE LOOP
XJ 804 FOR TIME=1 TO COUNT:B$=STR$(COUNT-
   TIME+1):LB=LEN(B$)
RY 805 REM UPDATE COUNT DISPLAY
AK 806 POSITION 11,8:? #6;"  ";:POSITION
   14-LB,8:? #6;B$;
MX 809 REM PHASE$=COMMAND
CP 810 IF INHALE THEN PHASE$="inhale":SEC
   S=INHALE:PITCH=0:GOSUB 40
LP 820 IF RETAIN THEN PHASE$="retain":SEC
   S=RETAIN:PITCH=1:GOSUB 40
ZV 830 IF EXHALE THEN PHASE$="exhale":SEC
   S=EXHALE:PITCH=2:GOSUB 40
KX 890 NEXT TIME:OFS=10
ZT 900 GOSUB 9000:GOTO 100:REM RESET SCRE
   EN & START OVER
UG 1000 REM INITIALIZATION
TS 7000 GRAPHICS 17:POKE 559,0:? #6:? #6;
   "     PRANAYAMA"
KE 7100 DL=PEEK(560)+PEEK(561)*256:REM DL
   =ADR OF DISPLAY LIST
PE 7200 OFS=10:REM OFFSET TO DL LINE
TO 7300 POKE DL+6,7:POKE DL+26,7:REM LARG
   E TEXT LINES
NK 8000 DIM S$(254):S$=" ":S$(254)=" ":S$
   (2)=S$:REM SCREEN OPTION DISPLAY
OK 8010 DIM PHASE$(6):PHASE$="      ":REM
    CURRENT PHASE OR COMMAND
YZ 8020 DIM B$(2):B$="  ":REM BLANK WORK
   STRING
```

continued on next page

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YOGA BREATHING continued

Don't type the TYPO II Codes!

```
XS 8100 S$(6,14)="sound   ON"
ZN 8110 S$(66,74)="count    1":COUNT=1
LK 8120 S$(126,134)="inhale   1":INHALE=1
AF 8130 S$(186,194)="retain   0":RETAIN=0
AK 8140 S$(246,254)="exhale   1":EXHALE=1
XN 8900 REM DISPLAY/SOUND SUBROUTINE
UM 9000 SOUND 0,(OFS-10)/3,2,1:POSITION 0
   ,5:? #6;S$;:SOUND 0,0,0,0:JIF=0:RETURN
```

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GRAPH 3-D

Article on page 46

LISTING 1

Don't type the TYPO II Codes!

```
GG 10 REM GRAPH 3-D LOADER
CX 20 REM BY PAUL CHABOT
FW 30 REM (c) 1985, ANTIC PUBLISHING
XQ 40 GOSUB 290:LBL=1536:IO=1704
TF 50 FOR I=1536 TO 1750
DY 60 READ X:POKE I,X:NEXT I
KD 70 RUN "D:GRAPH3D.BAS"
XY 80 REM PRINT TEXT IN GR.8, LOAD AT 153
   6
SO 90 DATA 104,201,4,240,9,170,240,5,104,
   104,202,208
DB 100 DATA 251,96,104,133,215,104,133,21
   4,104,104,168,104
TY 110 DATA 133,217,104,133,216,104,104,2
   40,236,133,212,24
VN 120 DATA 165,214,101,88,133,214,165,89
   ,101,215,133,215
MY 130 DATA 152,240,15,165,214,105,64,133
   ,214,165,215,105
MU 140 DATA 1,133,215,136,208,241,132,221
   ,160,0,132,220
```

continued on next page

```
WL 150 DATA 177,216,160,0,170,16,1,136,13
   2,213,138,41
CG 160 DATA 96,208,4,169,64,16,14,201,32,
   208,4,169
ZR 170 DATA 0,16,6,201,64,208,2,169,32,13
   3,218,138
IL 180 DATA 41,31,5,218,133,218,169,0,162
   ,3,6,218
DI 190 DATA 42,202,208,250,109,244,2,133,
   219,164,221,177
EG 200 DATA 218,69,213,164,220,145,214,20
   0,132,220,196,212
AL 210 DATA 208,182,24,165,214,105,40,133
   ,214,144,2,230
VY 220 DATA 215,230,221,169,8,197,221,208
   ,159,96,207,96
WC 230 REM BYTE I/O, LOAD AT 1704
NA 240 DATA 169,64,133,212,169,3,133,213,
   104,104
MF 250 DATA 104,10,10,10,10,170,216,24,10
   5,9
EL 260 DATA 168,104,145,212,136,104,145,2
   12,136,136
CI 270 DATA 136,104,145,212,136,104,145,2
   12,136,136
KT 280 DATA 104,104,145,212,76,86,228
UU 290 GRAPHICS 2:POKE 712,176:POKE 710,1
   76:POKE 752,1
ID 300 POSITION 3,1
XL 310 ? #6;"■ R ■ P ■ 3 ■"
KR 320 POSITION 4,4
SF 330 ? #6;"paul chabot"
NF 340 ? :? :? "     (c) 1985, Antic Publi
   shing":RETURN
```

LISTING 2

```
UQ 10 REM GRAPH 3-D, LISTING 2
CX 20 REM BY PAUL CHABOT
FW 30 REM (c) 1985, ANTIC PUBLISHING
EI 35 IF PEEK(1536)<>104 THEN RUN "D:GR3D
   LOAD.BAS"
IG 40 GOTO 2000
RF 100 REM **** THE FUNCTION ***********
BR 120 Z=X*X-Y*Y/2
ZD 130 RETURN
YJ 150 REM **** FIND SX,SY *************
NX 152 QX=QX-FX:QY=QY-FY:QZ=QZ-FZ
PF 154 SX=QX*A1+QY*A2+QZ*A3
VX 156 SY=QX*A4+QY*A5+QZ*A6
CP 158 SZ=QX*A7+QY*A8+QZ*A9
IX 160 X=ED-SZ:IF X<1 THEN X=1
OK 162 T=(M*ED)/(X+X)
FC 164 SX=T*SX+CX:SY=CY-T*SY
VD 166 IF SX<0 THEN SX=0
SZ 168 IF SX>319 THEN SX=319
VP 170 IF SY<0 THEN SY=0
QH 172 IF SY>191 THEN SY=191
ZH 174 RETURN
ZC 200 REM **** COMPUTE POINTS *********
YE 202 TRAP 800:POSITION 21,14
AL 204 ? " COMPUTING POINTS "
KI 212 DX=(BX-AX)/NX:DY=(BY-AY)/NY
SQ 214 X=AX-DX:C=132
OZ 216 FOR I=0 TO NX:X=X+DX:Y=AY-DY
MB 218 FOR J=0 TO NY:Y=Y+DY:GOSUB 100
PM 224 PX(I,J)=X:PY(I,J)=Y:PZ(I,J)=Z
OH 226 C=C+2:IF C>255 THEN C=0
KE 228 POKE 708,C:NEXT J:NEXT I
SI 230 POKE 708,132
ZK 232 RETURN
RI 300 REM **** GRAPH IT **************
VE 302 IF CF=1 THEN GOSUB 200:GOSUB 400
XH 304 GRAPHICS 24:GOSUB 1560:COLOR 1
XH 306 CF=0:GOSUB 1180:SI=1:SJ=1
WI 310 IF GF=1 THEN SJ=NY
VK 312 IF GF=2 THEN SI=NX
EN 314 IF GF=3 THEN SJ=3
EL 316 IF GF=4 THEN SI=3
TO 318 IF GF=5 THEN SI=3:SJ=3
LT 329 REM PERP. TO X-AXIS
MH 330 FOR I=0 TO NX STEP SI
TN 332 FOR J=0 TO NY:QX=PX(I,J)
QX 334 QY=PY(I,J):QZ=PZ(I,J):GOSUB 150
IZ 336 IF J=0 THEN PLOT SX,SY
WY 338 DRAWTO SX,SY:NEXT J:NEXT I
MN 339 REM PERP. TO Y-AXIS
OI 340 FOR J=0 TO NY STEP SJ
SP 342 FOR I=0 TO NX:QX=PX(I,J)
QZ 344 QY=PY(I,J):QZ=PZ(I,J):GOSUB 150
IT 346 IF I=0 THEN PLOT SX,SY
XH 348 DRAWTO SX,SY:NEXT I:NEXT J
GQ 350 GOSUB 1180:RETURN
QZ 400 REM **** FIX MATRIX ************
YG 402 TRAP 800:POSITION 21,14
TZ 404 ? "  fixing  matrix  "
NI 406 X=(AX+BX)/2:Y=(AY+BY)/2
RN 408 GOSUB 100
MA 410 FX=X:FY=Y:FZ=Z
LF 412 A7=EX-FX:A8=EY-FY:A9=EZ-FZ
NK 414 ED=SQR(EX*EX+EY*EY+EZ*EZ)
PU 416 A7=A7/ED:A8=A8/ED:A9=A9/ED
YO 418 A6=A7*A7+A8*A8
WI 420 IF A6=0 THEN A4=0:A5=1:GOTO 430
GK 422 IF A9=0 THEN A4=0:A5=0:A6=1:GOTO 4
   30
SE 424 IF A9<0 THEN A4=A7:A5=A8:A6=-A6/A9
   :GOTO 430
WA 426 A4=-A7:A5=-A8:A6=A6/A9
WS 430 A1=A5*A9-A6*A8
WD 432 A2=A6*A7-A4*A9
VO 434 A3=A4*A8-A5*A7
PT 436 XX=SQR(A4*A4+A5*A5+A6*A6)
TB 438 A4=A4/XX:A5=A5/XX:A6=A6/XX
AY 440 XX=SQR(A1*A1+A2*A2+A3*A3)
HA 442 A1=A1/XX:A2=A2/XX:A3=A3/XX
ZU 444 RETURN
JU 480 REM **** INPUT=[RETURN] *********
MG 482 IF PEEK(764)=255 THEN 482
ZV 484 IF PEEK(764)<>12 THEN RETURN
CJ 486 POKE 764,255:POP :RETURN
TO 500 REM **** MAG CHANGE *************
FO 502 ? "  magnification":?
TR 504 ? "    MAG=";M;"     INPUT ";
TM 506 GOSUB 480:INPUT M:GOSUB 1120
ZZ 508 RETURN
UE 520 REM **** OPTION FLAG ************
CV 522 GF=GF+1:IF GF>5 THEN GF=0
EJ 524 POSITION 13,3:? GF:RETURN
CG 550 REM **** EYE CHANGE *************
XO 552 ? "  eye   LOCATION":?
AP 554 ? E$;"        EX,EY,EZ"
QL 556 ? BL$(28);"INPUT ";:GOSUB 480
TS 558 INPUT EX,EY,EZ:GOSUB 1130
JB 560 GOSUB 400:RETURN
CL 600 REM **** INTERVAL CHANGE ********
WV 602 ? "   intervals":?
TM 604 ? I$;"     AX,BX,AY,BY"
QC 606 ? BL$(28);"INPUT ";:GOSUB 480
LP 608 INPUT AX,BX,AY,BY:GOSUB 1140
QC 610 CF=1:RETURN
PJ 620 REM **** PARTITION SIZE *********
IC 622 ? " partition  SIZES":?
RC 624 ? " NX,NY = ";NX;",";NY
EK 626 ? " INPUT ";:GOSUB 480
OA 628 INPUT NX,NY:IF NX<3 THEN NX=3
BC 630 IF NX>N THEN NX=N
UK 632 IF NY<3 THEN NY=3
CQ 634 IF NY>N THEN NY=N
QY 636 CF=1:RETURN
JX 650 REM **** CENTER CHANGE **********
QM 652 ? "  center  screen":?
PK 654 ? " CX,CY = ";CX;",";CY
EQ 656 ? " INPUT ";:GOSUB 480
LD 658 INPUT CX,CY:RETURN
EE 700 REM **** FUNCTION CHANGE ********
```

```
ET 702 ? " new function ":?
RR 704 ? Z$:? "Z=";:GOSUB 480:ZB$=Z$
SO 706 INPUT A$:Z$="Z=":Z$(3)=A$
QA 708 GOSUB 720:CF=1:RETURN
TY 720 REM **** CREATE LINE 120 ********
ZI 722 GOSUB 1100:? "120 ";Z$:? :? "CONT"
;
NN 724 POSITION 2,16:POKE 842,13:STOP
TE 726 POKE 842,12:RETURN
PN 750 REM **** RECOVER LAST FUNCTION **
ID 752 ? " ?? recover ??":?
KA 754 ? " Recover last function      Y/N"
XV 756 ? "** current will die **";
FN 758 L=PEEK(764):IF L=255 THEN 758
IL 760 POKE 764,255:IF L<>43 THEN RETURN
YV 762 A$=Z$:Z$=ZB$:ZB$=A$
QA 764 GOSUB 720:CF=1:RETURN
AO 800 REM **** VALUE ERROR TRAP *******
EU 802 GOSUB 1580:POSITION 21,14
DT 804 ? "**value***error**":POP :POP
WY 806 POKE 764,255:POSITION 2,16
BB 808 ? " TRY [any key]   - to recov
er "
GA 810 IF PEEK(764)=255 THEN 810
ZM 812 RETURN
LK 840 REM **** I/O TRAP ***************
FC 842 GOSUB 1580:POSITION 21,14
EK 844 CLOSE #2:? "*** e r r o r ***"
RZ 846 GOTO 806
NS 850 REM **** DISK DIRECTORY *********
MK 852 TRAP 840:POKE 82,21:POSITION 21,3
QN 854 FOR J=1 TO 10:? BL$(22):NEXT J
QA 856 POSITION 21,3
WG 858 CLOSE #2:OPEN #2,6,0,"D:*.G3D"
YM 860 FOR J=1 TO 10:FOR I=0 TO 1
IX 862 INPUT #2,A$:IF LEN(A$)=16 THEN 870

VM 864 ? A$(3,10);" ";:NEXT I:? :NEXT J
CE 870 CLOSE #2:POSITION 21,13:? A$
ZX 872 POKE 82,2:RETURN
NG 880 REM **** GET FILENAME ***********
IZ 882 ? " current name  ";FI$(3)
RU 884 ? " INPUT filename ";:GOSUB 480
VC 886 INPUT A$:FI$="D:":FI$(3)=A$
HB 888 FI$(LEN(FI$)+1)=".G3D":RETURN
IC 890 REM **** 2ND CHANCE *************
KF 891 GOSUB 2190:? " DO IT?      Y/N"
GC 892 ? "   filespecs  ";FI$
GL 894 L=PEEK(764):IF L=255 THEN 894
WW 896 POKE 764,255:IF L=43 THEN RETURN
WE 898 POP :RETURN
GI 900 REM **** SAVE TO DISK ***********
GT 902 ? "       S A V E":? :GOSUB 880
CK 904 GOSUB 890:GOSUB 1560:TRAP 840
BS 906 OPEN #2,8,0,FI$:POKE 1913,80
XR 908 X=USR(IO,2,7680,SA1,11)
LJ 910 ? #2;Z$:? #2;M
JX 912 ? #2;EX:? #2;EY:? #2;EZ
CX 914 ? #2;AX:? #2;BX
EH 916 ? #2;AY:? #2;BY
FO 918 ? #2;CX:? #2;CY
QO 920 ? #2;NX:? #2;NY
DA 922 CLOSE #2:POKE 1913,87
DL 924 GOSUB 1580:GOSUB 850:RETURN
FK 930 REM **** LOAD FROM DISK *********
ME 932 ? "       L O A D":? :GOSUB 880
CQ 934 GOSUB 890:GOSUB 1560:TRAP 840
NR 936 ZB$=Z$:OPEN #2,4,0,FI$
FC 938 X=USR(IO,2,7680,SA1,7)
JL 940 INPUT #2;Z$:INPUT #2;M
NH 942 INPUT #2;EX:INPUT #2;EY:INPUT #2;E
Z
CV 944 INPUT #2;AX:INPUT #2;BX
ER 946 INPUT #2;AY:INPUT #2;BY
GK 948 INPUT #2;CX:INPUT #2;CY
WM 950 INPUT #2;NX:INPUT #2;NY
DE 952 CLOSE #2:GOSUB 1580
KG 954 GOSUB 1120:GOSUB 1130:GOSUB 1140
OG 956 GOSUB 720:CF=1:RETURN
IU 960 REM **** PRINT IT ***************
XK 961 ? " ?? PRINT   IT ??":?
ET 962 ? "        title  ";FI$(3):?
HL 963 ? "  1-LEFT              2-RIGHT"
CU 964 K=PEEK(764):IF K=255 THEN 964
XD 966 POKE 764,255:TRAP 840
LY 968 IF K<>31 AND K<>30 THEN RETURN
HM 970 CLOSE #2:OPEN #2,8,0,"P:"
DC 971 REM INITIALIZE
EJ 972 ? #2;CHR$(27);CHR$(64);
SS 973 REM FILENAME
WY 974 IF K=30 THEN ? #2;BL$;
HD 976 ? #2;CHR$(14);"  ";FI$(3)
GD 977 REM SET LINE FEED
IM 978 ? #2;CHR$(27);CHR$(51);CHR$(16)
SA 980 X=SA1+192*40
GU 982 FOR I=0 TO 39:T=X+I
DZ 984 FOR J=1 TO 192:T=T-40
XU 986 B$(J,J)=CHR$(PEEK(T)):NEXT J
YN 987 REM PRINT GRAPHICS STRING
XM 988 IF K=30 THEN ? #2;BL$;
QJ 990 ? #2;CHR$(27);CHR$(75);CHR$(192);C
HR$(0);B$
GX 992 NEXT I
IV 994 CLOSE #2:RETURN
KO 1100 REM **** FORCED READ ***********
VF 1102 POSITION 2,18:? BL$
YR 1104 POSITION 2,18:RETURN
HL 1110 POSITION 1,18
VW 1112 POKE 842,13:INPUT A$
UR 1114 POKE 842,12:RETURN
UC 1120 REM **** FILL M$
PP 1122 GOSUB 1100:? "MAG:";M
ZE 1124 GOSUB 1110:M$=A$:RETURN
OB 1130 REM **** FILL E$
XP 1132 GOSUB 1100
SD 1134 ? "EYE:";EX;",";EY;",";EZ
UJ 1136 GOSUB 1110:E$=A$:RETURN
RG 1140 REM **** FILL I$
XS 1142 GOSUB 1100
KO 1144 ? "[";AX;",";BX;"]*[";AY;",";BY;"
]"
XC 1146 GOSUB 1110:I$=A$:RETURN
EL 1150 REM **** FILL Z$
CF 1152 GOSUB 1100:POSITION 2,17:LIST 120

GR 1154 GOSUB 1110:Z$=A$(5):RETURN
CY 1180 REM **** LABEL SCREEN **********
SG 1182 X=USR(LBL,32,2,ADR(M$),LEN(M$))
IT 1184 X=USR(LBL,0,23,ADR(I$),LEN(I$))
XT 1186 X=USR(LBL,22,23,ADR(E$),LEN(E$))
IP 1188 L=LEN(Z$):IF L>40 THEN L=40
DP 1190 X=USR(LBL,0,0,ADR(Z$),L)
JZ 1192 IF LEN(Z$)<41 THEN RETURN
RB 1194 X=USR(LBL,0,1,ADR(Z$)+40,LEN(Z$)-
40)
CA 1196 RETURN
EA 1500 REM ****SETUP 2 SCREENS ********
BG 1502 RAM=PEEK(106):GRAPHICS 24:MOD1=8
CZ 1504 DL1L=PEEK(560):DL1H=PEEK(561)
OU 1506 SA1L=PEEK(88):SA1H=PEEK(89)
HI 1508 SA1=SA1L+256*SA1H
IH 1510 POKE 106,RAM-33:GRAPHICS 0:MOD2=0

DZ 1512 DL2L=PEEK(560):DL2H=PEEK(561)
PT 1514 SA2L=PEEK(88):SA2H=PEEK(89)
XG 1516 DL=DL2L+256*DL2H:POKE 106,RAM
QR 1518 POKE DL+3,71:POKE DL+6,6
TZ 1520 POKE DL+8,64:POKE DL+21,6
FJ 1522 POKE DL+22,6:POKE DL+24,48
BF 1524 RETURN
WV 1560 REM **** SCREEN 1 - PICTURE ****
EI 1562 POKE 560,DL1L:POKE 561,DL1H
SA 1564 POKE 88,SA1L:POKE 89,SA1H
DC 1566 POKE 709,26:POKE 710,0:POKE 712,1
28
PL 1568 POKE 87,MOD1:RETURN
EI 1580 REM **** SCREEN 2 - MENU *******
GK 1582 POKE 560,DL2L:POKE 561,DL2H
TZ 1584 POKE 88,SA2L:POKE 89,SA2H
JV 1586 POKE 709,24:POKE 710,194:POKE 712
```

continued on next page

```
   ,224:POKE 708,132:POKE 711,68
UU 1588 POKE 87,MOD2:POKE 752,1:RETURN
XH 2000 REM *** MAIN ROUTINE ************
YE 2002 GOSUB 2200
WA 2010 GOSUB 1580:POSITION 21,14
ZR 2012 ? "?■?■what■■next■?■?";:TRAP 840
BW 2014 GOSUB 2170
AE 2016 K=PEEK(764):IF K=255 THEN 2016
WS 2018 POKE 764,255:GOSUB 2190
OL 2020 POSITION 21,14:? BL$(21):POSITION
    21,14
FZ 2022 IF K=61 THEN GOSUB 300:REM ...G
SA 2024 IF K=37 THEN GOSUB 500:REM ...M
IH 2026 IF K=8 THEN GOSUB 520:REM ....O
KR 2028 IF K=42 THEN GOSUB 550:REM ...E
KG 2030 IF K=13 THEN GOSUB 600:REM ...I
VG 2032 IF K=35 THEN GOSUB 620:REM ...N
JW 2034 IF K=18 THEN GOSUB 650:REM ...C
LB 2036 IF K=56 THEN GOSUB 700:REM ...F
DU 2038 IF K=40 THEN GOSUB 750:REM ...R
OJ 2040 IF K=58 THEN GOSUB 850:REM ...D
DB 2042 IF K=62 THEN GOSUB 900:REM ...S
FI 2044 IF K=0 THEN GOSUB 930:REM ....L
CM 2046 IF K=10 THEN GOSUB 960:REM ...P
RR 2048 IF K=33 THEN GOSUB 1560:REM SPACE

XB 2050 IF PEEK(764)=255 AND PEEK(87)=8 T
   HEN 2050
VY 2052 IF PEEK(764)=33 THEN POKE 764,255

OF 2060 GOTO 2010
IV 2100 REM **** MAIN MENU **************
VY 2102 POKE 752,1:POSITION 2,0
QT 2110 ? "■g■r■a■p■h■3■D■     ^^^^^^^^^^^^
   ^^^^^^"
QQ 2112 ? "  Paul Chabot              1985"

XU 2114 ? "■[G]■GRAPH■IT■     ■■■■■DIRECTO
   RY■■■■"
ED 2116 ? "[O] Option 0         ■"
TG 2118 ? "[F] Function         ■"
SG 2120 ? "[M] Magnification ■"
QM 2122 ? "[E] Eye Position  ■"
ZC 2124 ? "[C] Center Screen ■"
HP 2126 ? "[I] Intervals       ■"
VP 2128 ? "[N] Partition size■"
VJ 2130 ? "[R] Recover last  ■"
WX 2132 ? "■■■■■■■I■/■O■■■■■■  ■"
XH 2134 ? "[L] Load  [S] Save■"
SE 2136 ? "[P] Print [D] Dir.■"
WF 2138 ? "OoOoOoOoOoOoOoOo"
SG 2140 ? "■■■■■■■[SPACE]■■■-■■Picture■/■Me
   nu■■■■■"
MM 2150 GOSUB 850:RETURN
TI 2170 REM **** MINI-MENU
OS 2172 GOSUB 2190:? I$;"      ";E$
XL 2174 ? Z$:RETURN
VD 2190 REM **** CLEAN-UP
FW 2192 POSITION 1,18:? " "
HS 2194 FOR I=16 TO 21:POSITION 2,I
WE 2196 ? BL$;:NEXT I
YZ 2198 POSITION 2,16:RETURN
RW 2200 REM **** INITIALIZE ************
GP 2202 N=24:LBL=1536:IO=1704:M=150
BX 2204 AX=-1:BX=1:AY=-1:BY=1:NX=8:NY=10
OC 2206 EX=10:EY=10:EZ=5:CX=160:CY=100
TP 2210 DIM PX(N,N),PY(N,N),PZ(N,N)
LC 2212 DIM A$(78),I$(19),E$(15),M$(9)
ZA 2214 DIM Z$(78),ZB$(78),FI$(14)
MX 2216 DIM B$(192),BL$(38)
NY 2218 BL$=" ":BL$(38)=" ":BL$(2)=BL$
WJ 2220 FI$="D:SAMPLE.G3D"
UQ 2230 GOSUB 1500:GOSUB 1580:GOSUB 2100
PT 2232 GOSUB 1120:GOSUB 1130:GOSUB 1140
DX 2234 GOSUB 1150:CF=1:GF=0:GOSUB 300
RF 2240 ZB$=Z$:RETURN
```

TYPO II UPDATE

Here's a TYPO II update many readers requested for another **Antic** golden oldie — Math Wizard by Matthew Ratcliff (April, 1984). Only the line numbers and TYPO II codes are shown.

MATH WIZARD

ZJ	5	UD	190	WJ	400	IK	610	VA	820	YY	1030
XF	6	GW	200	NG	410	JW	620	HB	830	HF	1040
QG	7	TA	210	ZE	420	UD	630	OQ	840	VJ	1050
HD	10	JS	220	PQ	430	CX	640	HD	850	XO	1060
LQ	20	NN	230	OC	440	IF	650	BM	860	WV	1070
HB	30	CT	240	AT	450	DO	660	IX	870	ZQ	1080
PC	40	LR	250	LK	460	PT	670	DX	880	SE	1090
EU	50	IH	260	ZG	470	II	680	AN	890	HJ	1100
DE	60	UV	270	JR	480	LY	690	AH	900	FO	1110
BT	70	ZB	280	RS	490	NJ	700	DX	910	GT	1120
XU	80	PZ	290	EU	500	CQ	710	BE	920	XC	1130
KE	90	QN	300	ZD	510	XW	720	CO	930	AB	1140
TE	100	TO	310	RZ	520	XD	730	EG	940	MS	1150
MG	110	QG	320	QS	530	NU	740	PR	950	KL	1160
ON	120	IU	330	UA	540	KO	750	SF	960	SI	1170
CD	130	KZ	340	HT	550	ZP	760	JM	970	GT	1180
JM	140	MB	350	GH	560	BG	770	JX	980	HN	1190
XW	150	BD	360	XT	570	DS	780	IM	990	WV	1200
TC	160	LX	370	AH	580	PZ	790	LA	1000	FG	1210
LR	170	GJ	380	EC	590	ZE	800	YK	1010		
BZ	180	RT	390	HP	600	FG	810	TV	1020		

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KZ	1220	DX	1440	NJ	1660
YB	1230	NX	1450	QD	1670
AM	1240	GW	1460	FR	1680
DR	1250	RL	1470	SQ	1690
OV	1260	IU	1480	NJ	1700
QT	1270	ZZ	1490	RR	1710
BX	1280	HP	1500	EG	1720
NN	1290	PC	1510	KF	1730
KY	1300	QL	1520	DV	1740
XM	1310	CI	1530	BD	1750
MD	1320	XS	1540	OL	1760
VE	1330	LC	1550	PI	1770
WZ	1340	MD	1560	JL	1780
LO	1350	UL	1570	PP	1790
QJ	1360	YY	1580	TY	1800
FG	1370	NS	1590	FF	1810
TE	1380	OA	1600	NX	1820
RF	1390	YP	1610	KM	1830
LE	1400	EG	1620	NM	1840
PC	1410	VQ	1630	XF	1850
DB	1420	AH	1640	CE	1860
OI	1430	KE	1650		

game of the month

ALIEN ASYLUM

Article on page 31

LISTING 1

Don't type the TYPO II Codes!

```
UK 10 REM ASYLUM
PG 20 REM BY SPENCER CRASKE
ZF 30 REM (c) 1985, Antic Publishing Co.
EV 40 I=1:GRAPHICS 17:SETCOLOR 4,7,2:SETC
   OLOR 3,0,14:SETCOLOR 0,2,14
CX 50 SETCOLOR 2,3,6:SETCOLOR 1,12,12:GOS
   UB 150
CR 60 POKE 106,PEEK(740)
YU 70 SC=PEEK(88)+256*PEEK(89):MN=3:KL=5:
   S=1:EG=50:NF=1:DIM IN$(4)
IB 80 DIM A$(50):A$="▣▣▣ ██▣▣▣▣ ██▣▣▣▣█ █▣▣
   ▣█ █▣▣▣▣█ █"
FN 90 DIM B$(50):B$="SSS ██SSS ██SSS ██SS
   S ██SSS █"
BZ 100 DIM C$(50):C$="SSS ██▣▣▣▣ ██SSS ██▣
   ▣▣ ██SSS ██"
JG 110 POSITION 0,21:? #6;"score:        k
   eys:":POSITION 0,22:? #6;"men:   level:
     SP:"
PK 120 NTOP=PEEK(106)-10:POKE 106,NTOP:NS
   ET=NTOP*256:DIM CM$(32)
YT 130 CM$="hh▜Uh▜Th▜Ch▜UQ┤█♥1T▜UHPMfUfKJ
   PP◆"
NG 140 CM=USR(ADR(CM$),57344,NSET):POKE 7
   56,NTOP:GOTO 170
SJ 150 POSITION 6,I-1:? #6;"        ":POSITI
   ON 5,I+1:? #6;"        "
NH 160 POSITION 6,I:? #6;"alien":POSITION
    5,I+2:? #6;"ASYLUMS":RETURN
HB 170 FOR T=0 TO 47:READ A:POKE NSET+8+T
   ,A:NEXT T
IG 180 FOR X=0 TO 419:POKE SC+X,6:NEXT X:
   COLOR 130:PLOT 0,0:DRAWTO 19,0:DRAWTO
   19,20:DRAWTO 0,20:DRAWTO 0,0
JM 190 X=10:Y=9:PX=10:PY=Y:GOSUB 420
PR 200 Q=PEEK(632):LY=(Q=13)-(Q=14):LX=(Q
   =7)-(Q=11)
KL 210 IF LX=0 AND LY=0 THEN LY=OLY:LX=OL
   X
WR 220 OLX=LX:OLY=LY
HX 230 POSITION 1,10:? #6;C$(S,S+17):POSI
   TION 1,15:? #6;B$(S,S+17)
WZ 240 POSITION 1,5:? #6;A$(S,S+17)
ZM 250 IF S+17=LEN(A$)-1 THEN R=0
AR 260 IF S=1 THEN R=1
MD 270 IF PEEK(20)>=110-(10*KL) THEN S=S+
   (R*2)-1:POKE 20,0
BS 280 Y=Y+LY:X=X+LX:LOCATE X,Y,C:IF C=38
    THEN SOUND 0,250,10,10:SOUND 0,0,0,0:
   SR=SR+10:B=B+1:EG=EG+2
IY 290 IF C=130 THEN X=PX:Y=PY:LOCATE X,Y
   ,C
PL 300 IF Y=5 OR Y=10 OR Y=15 THEN IF C=1
   63 OR C=164 THEN GOSUB 630
GE 310 IF C=1 THEN K=K+1:SR=SR+100:FOR I=
   0 TO 30:SOUND 0,RND(0)*255,10,14:NEXT
   I:SOUND 0,0,0,0
IH 320 COLOR 32:PLOT PX,PY:COLOR 133:PLOT
    X,Y:PX=X:PY=Y
UI 330 EG=EG-1:IF EG<=0 THEN GOSUB 630
HG 340 IF G=0 THEN IF SR>=10000 THEN G=1:
   MN=MN+1
WT 350 IF EG>99 THEN EG=99
TB 360 POSITION 18,21:? #6;"  "
PS 370 POSITION 6,21:? #6;SR:POSITION 18,
   21:? #6;KL-K:POSITION 4,22:? #6;MN:POS
   ITION 12,22:? #6;LVL
LP 380 POSITION 18,22:? #6;"  ":POSITION
   18,22:? #6;EG
AX 390 POKE NSET+52,NF:NF=NF*2:IF NF>128
   THEN NF=1
WL 400 IF K=KL THEN LVL=LVL+1:S=1:KL=5+LV
   L:K=0:I=0:GOTO 670
LV 410 GOTO 200
```

```
GA 420 POSITION 1,10:? #6;C$(S,S+17):POSI
   TION 1,15:? #6;B$(S,S+17):POSITION 1,5
   :? #6;A$(S,S+17)
CX 430 FOR T=1 TO KL
VP 440 COLOR 1:R=INT(RND(0)*20):RR=INT(RN
   D(0)*20):LOCATE R,RR,C:IF C<>38 THEN 4
   40
SP 450 PLOT R,RR:NEXT T:RETURN
KV 460 SOUND 1,0,0,0:SOUND 0,0,0,0:FOR X=
   0 TO 419:POKE SC+X,0:NEXT X
TU 470 POSITION 0,4:? #6;" you have achie
   ved      level ";LVL:IF SR>=HISC THEN H
   ISC=SR
LQ 480 CLOSE #1
GZ 490 IF HISC=SR THEN ? #6;"ENTER INITIA
   LS":OPEN #1,4,0,"K:":GOTO 510
MY 500 IN=0:GOTO 560
WS 510 C=1:IN$="   ":TRAP 510
NL 520 IF C<1 OR C>4 THEN 510
NI 530 GET #1,IN:IF IN=155 THEN 570
FC 540 IF IN=254 OR IN=126 OR IN=30 THEN
   IN$(C)="   ":C=C-1:POSITION 7+C,12:? #
   6;" ":GOTO 520
FG 550 IN$(C,C)=CHR$(IN):C=C+1
BQ 560 POSITION 0,10:? #6;"HI-SCORE IS ";
   HISC;" BY:":POSITION 8,12:? #6;IN$(1,3
   ):IF IN<>0 THEN 520
WI 570 POSITION 3,20:? #6;"PRESS TRIGGER"
EH 580 CR=8
VX 590 CR=CR-121*(CR>120)+1:FOR X=708 TO
   711:POKE X,CR+32*(X-708):NEXT X:IF STR
   IG(0) THEN 590
XN 600 SETCOLOR 4,7,2:SETCOLOR 3,0,14:SET
   COLOR 0,2,14:SETCOLOR 2,3,6:SETCOLOR 1
   ,12,12
QA 610 OLX=0:OLY=0:LVL=0:SR=0:K=0:KL=5:S=
   1:MN=3:EG=50:POSITION 6,21
EG 620 ? #6;"          ":GOTO 180
FO 630 COLOR 32:PLOT PX,PY:COLOR 37:PLOT
   X,Y
MH 640 MN=MN-1:X=10:Y=9:FOR T=100 TO 0 ST
   EP -1:SOUND 0,T+75,10,15:SOUND 1,(100-
   T)+75,10,15:NEXT T:IF MN=-1 THEN 460
DV 650 SOUND 0,0,0,0:SOUND 1,0,0,0
MR 660 OLX=0:OLY=0:EG=50:RETURN
JD 670 FOR I=1 TO 5:CM$(I,I)=CHR$(PEEK(70
   7+I)):NEXT I:FOR I=0 TO 9
XH 680 FOR Y=708 TO 712:POKE Y,PEEK(Y)+I:
   NEXT Y:NEXT I
ZJ 690 FOR I=1 TO 5:POKE 707+I,ASC(CM$(I,
   I)):NEXT I
OL 700 OLX=0:OLY=0:EG=50:GOTO 180
AM 710 DATA 7,5,253,165,165,7,0,0,0,60,12
   6,126,126,126,60,0,124,84,254,146,214,
   0,0,0,124,214,214,124,56
KY 720 DATA 124,84,0,16,84,56,238,56,84,1
   6,0,0,0,0,00,16,0,0,0
```

bonus game

LEMONADE

Article on page 32

LISTING 1

Don't type the TYPO II Codes!

```
TR 5 REM LEMONADE
DT 10 REM BY BOB POLARO
BP 12 REM ANTIC PUBLISHING
JO 15 OPEN #1,4,0,"K:":OPEN #3,4,0,"S:":G
   OTO 40
SS 20 FOR Z9=1 TO 10:NEXT Z9:SOUND 2,0,0,
   0:RETURN
HW 30 POSITION 0,11:? #6;B$;B$;:POSITION
   0,11:RETURN
VC 40 DIM I$(5),X$(20),P(8),B$(20)
PW 50 GRAPHICS 17
JP 60 B$="                    ":GOTO 110
CF 70 SETCOLOR 4,0,0:SOUND 3,100,80,10:FO
   R Z9=1 TO 20:NEXT Z9:SOUND 3,0,0,0:RET
   URN
YA 80 RESTORE 90:POSITION 1,13:? #6;"▒▒▒▒
   ▒▒▒▒▒▒▒▒▒▒▒▒▒▒":FOR I=1 TO 8:READ X$:P
   RINT #6;" ";X$:NEXT I:RETURN
ZJ 90 DATA signs,made,sold,price,income,e
   xpenses,profit,assets
UR 100 AS=INT(H*XS+H4):RETURN
EP 110 S2=30:P(8)=2:S3=0.15:H=100:H4=0.5:
   C=2
BC 120 PRINT #6;"      lemonade"
NY 130 D=D+1
SM 140 FOR I=5 TO 7:POSITION 0,I:PRINT #6
   ;B$;:NEXT I
HR 150 POSITION 0,2:P(3)=0:? #6;" DAY ";D
EP 160 O8=P(8):GOSUB 700
TU 170 ? #6;" ASSETS     $";X$;"    "
DP 180 C3=0:X$="":GOSUB 760:IF RN>5 THEN
   220
PK 190 RESTORE 200:FOR I=1 TO RN:READ X$,
   C3:NEXT I
DE 200 DATA teamsters strike,4,lemon shor
   tage,6
CJ 210 DATA prices down,-4,supply increas
   e,-4,i n f l a t i o n,2
PM 220 C=C+C3:IF C<2 THEN C=2
UR 230 C1=C*0.01
UM 240 POSITION 0,4:? #6;" COST/GLASS=";:
   I$=STR$(C/100):IF LEN(I$)<4 THEN I$(4,
   4)="0"
AH 250 ? #6;I$(2,4):R=1:P(4)=0:P(1)=0:IF
   X$<>"" THEN ? #6;" ";X$
SY 260 GOSUB 760:RR=RN
JH 270 IF RN=1 THEN ? #6;" a chance of ra
   in":R=0.5
VC 280 IF RN=2 THEN ? #6;" roadwork today
   ":R=0:SOUND 3,100,60,100
IB 290 IF RN=3 THEN ? #6;" h e a t  w a v
    e":R=2
GY 300 POSITION 0,8:? #6;" NO. OF GLASSES
    --":X=16:Y=8:L=2:M0=18:GOSUB 740:? #6
   ;" ":SOUND 3,0,0,0:IF BAD=1 THEN 300
FS 310 IF I0>99 THEN 300
HK 320 XS=I0*C1:GOSUB 100:X1=AS:XS=P(8):G
   OSUB 100
CT 330 IF X1<=AS THEN 350
FO 340 GOSUB 690:GOTO 300
HN 350 P(2)=I0:GOSUB 760:IF NO=0 THEN S3=
   (RN+7)*0.01
CV 360 POSITION 0,9:? #6;" SIGNS @ ";S3*1
   00;" CENTS - ":X=17+LEN(STR$(S3*100))-
   1:Y=9:L=1:M0=19:GOSUB 740
EX 365 IF BAD THEN 360
QM 370 IF I0>9 THEN 360
TM 380 O8=P(8)-P(2)*C1:XS=I0*S3:GOSUB 100
   :X1=AS:XS=O8:GOSUB 100:IF X1<=AS THEN
   400
```

continued on next page

```
KU 390 GOSUB 690:GOTO 360
GC 400 P(1)=I0
UD 410 POSITION 1,10:? #6;"PRICE/GLASS --
   ":X=13:Y=10:L=2:M0=20:GOSUB 740:? #6;"
    ":IF BAD THEN 410
KR 420 P(4)=I0:M7=0
PR 430 GOSUB 30:? #6;" okay?(y/n)-";:X=11
   :Y=11:L=1:GOSUB 770:IF I$="" THEN 430
OZ 440 NO=0:IF I$(1,1)="N" THEN NO=1:GO T
   O 300
QP 450 IF I$(1,1)<>"Y" THEN 430
QF 460 GOSUB 30:GOSUB 760:IF RN>5 THEN 49
   0
EW 470 IF RR=1 THEN ? #6;" s t o r m ! !":
   FOR I=1 TO 40:SETCOLOR 4,0,12:GOSUB 70
   :NEXT I:P(3)=0:GOSUB 30:GOTO 540
ZJ 480 IF RR=2 THEN GOSUB 30:? #6;" worke
   rs buy it all":? #6;" at lunch!!":P(3)
   =P(2):GOTO 540
MW 490 IF P(4)>12 THEN 510
LV 500 N1=(12-P(4))/12*0.8*S2+S2:GO TO 52
   0
ZW 510 N1=(12^2*S2/P(4)^2)
XI 520 N2=R*(N1+N1*(1-EXP(-P(1)*C9)*C2))
BI 530 GOSUB 760:P(3)=INT(N2*(0.95+RN*0.1
   ))
YG 540 XS=P(3):GOSUB 100:X1=AS
FY 550 XS=P(2):GOSUB 100
HA 560 IF X1<=AS THEN 580
YC 570 P(3)=P(2)
TH 580 P(5)=P(3)*P(4)*0.01:P(6)=P(1)*S3+P
   (2)*C1
AN 590 P(7)=P(5)-P(6):P(8)=P(8)+P(7)
VQ 600 GOSUB 80
FG 610 FOR F=1 TO 8:O8=P(F):IF F=4 THEN O
   8=O8/100
VU 620 GOSUB 670:NEXT F
XS 630 IF P(8)>=C1 THEN 130
JL 640 GOSUB 30:? #6;" bankrupt!!":GOSUB
   730
ZP 650 GOSUB 30:? #6;" PRESS start BUTTON
   ":GOSUB 770
QJ 660 GOTO 660
DF 670 X$=STR$(O8):SG=0:IF F>3 THEN GOSUB
    700:IF O8<0 THEN SG=-1
XC 680 POSITION 10,F+13:? #6;"          ":P
   OSITION 11+SG,F+13:? #6;X$:RETURN
RY 690 GOSUB 30:PRINT #6;" not enough ass
   ets":GOSUB 730:GOSUB 30:RETURN
QH 700 I$="":IF O8*10=INT(O8*10) THEN I$=
   "0"
FW 710 IF O8=INT(O8) THEN I$=".00"
LU 720 X$=STR$(O8):X$(LEN(X$)+1)=I$:RETUR
   N
KO 730 SOUND 2,29,2,7:FOR Z=1 TO 200:NEXT
    Z:GOTO 20
PQ 740 BAD=0:GOSUB 770:X$=I$:TRAP 750:I0=
   VAL(X$):RETURN
GI 750 BAD=1:RETURN
QU 760 RN=INT(RND(0)*10)+1:RETURN
EP 770 O=0:I$="":SOUND 2,100,100,100:GOSU
   B 20
EJ 780 IF PEEK(53279)=6 THEN RUN
LS 790 IF L=20 AND PEEK(764)=255 THEN 780
SV 800 POSITION X+O,Y:GET #3,J
HC 810 POSITION X+O,Y:? #6;CHR$(J):IF PEE
   K(764)=255 THEN POSITION X+O,Y:? #6;"
   "
DY 820 IF PEEK(53279)=6 THEN RUN
GE 830 IF PEEK(764)=255 THEN 810
PJ 840 POSITION X+O,Y:GET #1,XX:POKE 764,
   255:IF XX=155 OR XX=126 THEN RETURN
LK 850 O=O+1:I$(LEN(I$)+1)=CHR$(XX):PRINT
   #6;CHR$(XX);:IF O=L THEN L=20:RETURN
OR 860 GOTO 800
```

assembly language

FINE SCROLLING WORLD: PART II

Article on page 72

LISTING 1

```
0 ; FINE SCROLLING, LISTING 1
10 ; BY MARK ANDREWS
20 ; ANTIC PUBLISHING
30 ;
40        *=  $3000
45        JMP INIT
50 ;
60 SDMCTL  =  $022F
70 ;
80 SDLSTL  =  $0230
90 SDLSTH  =  $0231
0100 ;
0110 COLOR0 = $02C4   ;OS COLOR REGISTE
R
0120 COLOR1 = $02C5
0130 COLOR2 = $02C6
0140 COLOR3 = $02C7
0150 COLOR4 = $02C8
0160 HSCROL = $D404
0162 VVBLKI = $0222   ;OS INTERRUPT VEC
TOR
0164 SYSVBV = $E45F   ;INTERRUPT ENABLE
 VECTOR
0166 SETVBI = $E45C   ;SET VERTICAL BLA
NK INTERRUPT VECTOR
0168 XITVBL = $E462   ;EXIT VBI VECTOR
0170 TCKPTR = $2000
0180 FSCPTR = TCKPTR+1
0190      .OPT OBJ
0200 ;
0210 ; DISPLAY LIST DATA
0220 ;
0230 START
0240 LINE1 .SBYTE "   ANTIC PRESENTS
 "
0250 LINE2 .SBYTE "
 "
0260      .SBYTE "       fine scrolling
 "
0270 LINE3 .SBYTE "              On You
r"
0280      .SBYTE " Atari               "
0290 LINE4 .SBYTE "   BY (YOUR NAME)
 "
0300 ;
0310 ; DISPLAY LIST
```

```
0320 ;
0330 HLST NOP          ;('HELLO' LIST)
0340      .BYTE $70,$70,$70
0350      .BYTE $70,$70,$70,$70,$70
0360      .BYTE $46
0370      .WORD LINE1
0380      .BYTE $70,$70,$70,$70,$57
0390 SCROLN NOP        ;(THIS IS THE LIN
E WE'LL SCROLL)
0400      .WORD $00    ; A BLANK TO BE F
ILLED IN LATER
0410      .BYTE $70,$42
0420      .WORD LINE3
0430      .BYTE $70,$70,$70,$70,$46
0440      .WORD LINE4
0450      .BYTE $70,$70,$70,$70,$70
0460      .BYTE $41
0470      .WORD HLST
0480 ;
0490 ; RUN PROGRAM
0500 ;
0510 INIT NOP          ;PREPARE TO RUN P
ROGRAM
0520      LDA COLOR3   ; SET COLOR REGIS
TER
0530      STA COLOR1
0540      LDA COLOR4
0550      STA COLOR2
0560 ;
0570      LDA #0       ; TELL ANTIC WHER
E DISPLAY LIST IS
0580      STA SDMCTL
0590      LDA #HLST&255
0600      STA SDLSTL
0610      LDA #HLST/256
0620      STA SDLSTH
0630      LDA #$22
0640      STA SDMCTL
0645      JSR TCKSET   ; INITIAIZE TICKE
R ADDRESS
0650 ;
0660 ; FINE-SCROLLING ROUTINE
0680      LDA #42      ; # OF CHARACTERS
 IN SCROLL LINE
0690      STA TCKPTR
0700      LDA #8
0710      STA FSCPTR   ; NUMBER OF COLOR
 CLOCKS TO FINE-SCROLL
0720 ;
0730 ; ENABLE INTERRUPT
0740 ;
0750      LDY #TCKINT&255
0760      LDX #TCKINT/256
0770      LDA #6
0780      JSR SETVBI
0790 ;
0800 ; TICKER INTERRUPT
0810 ;
0820 TCKINT
0830      LDA #SCROLL&255
0840      STA VVBLKI
0850      LDA #SCROLL/256
0860      STA VVBLKI+1
0870 ;
0880 INFIN
0890      JMP INFIN    ; INFINITE LOOP
0900 ;
0910 SCROLL
0920      LDX FSCPTR   ;8 TO START
0925      DEY
0930      DEX
0940      STX HSCROL
0950      BNE CONT
0960      LDX #8
0970 CONT NOP          ; (CONTINUE)
0980      STX FSCPTR
0990      CPX #7
1000      BEQ COARSE
1010      JMP SYSVBV
1020 COARSE
1030      LDY TCKPTR   ; NUMBER OF CHARA
CTERS TO SCROLL
1040      DEY
1050      BNE SCORSE   ; LOOP BACK TILL
ENTIRE LINE IS SCROLLED
1060      LDY #42
1070      JSR TCKSET   ; RESET TICKER LI
NE
1080 SCORSE NOP        ; DO COARSE SCROL
L
1090      STY TCKPTR
1100      INC SCROLN   ; LOW BYTE OF ADD
RESS
1110      BNE RETURN
1120      INC SCROLN+1 ; HIGH BYTE OF A
DDRESS
1130 RETURN
1140      JMP SYSVBV
1150 ;
1160 TCKSET
1170      LDA #LINE2&255
1180      STA SCROLN
1190      LDA #LINE2/256
1200      STA SCROLN+1
1210 ENDIT
1220      RTS
1280      *=   $02E0
1290      .WORD INIT
```

LISTING 2

```
0 ; FINE SCROLLING, LISTING 2
10 ; BY MARK ANDREWS
20 ; ANTIC PUBLISHING
0190 ;
0240 LINE1 .BYTE $00,$00,$00,$21,$2E,$
34,$29,$23,$00
0245       .BYTE $30,$32,$25,$33,$25,$2E
,$34,$33,$00,$00,$00
0250 LINE2 .BYTE $00,$00,$00,$00,$00,$
00,$00,$00,$00,$00,$00
0255       .BYTE $00,$00,$00,$00,$00,$00
,$00,$00,$00,$00,$00,$00,$00
0260       .BYTE $00,$00,$00,$00,$00,$00
,$66,$69,$6E,$65,$00,$73,$63,$72
0265       .BYTE $6F,$6C,$6C,$69,$6E,$67
,$00,$00,$00,$00,$00,$00,$00,$00
0270 LINE3 .BYTE $00,$00,$00,$00,$00,$
00,$00,$00,$00,$00,$00,$00
0275       .BYTE $2F,$6E,$00,$39,$6F,$75
,$72
0280       .BYTE $00,$21,$74,$61,$72,$69
,$00,$00,$00,$00,$00
0285       .BYTE $00,$00,$00,$00,$00,$00
,$00,$00,$00
0290 LINE4 .BYTE $00,$00,$00,$22,$39,$
00,$08,$39,$2F,$35,$32
0295       .BYTE $00,$2E,$21,$2D,$25,$09
,$00,$00,$00
```

st section

GEM COLOR CASCADE

Article on page 20

LISTING 1

```
VE 10 REM SINE WAVES
PB 20 REM BY PATRICK BASS
FW 30 REM (c) 1985, ANTIC PUBLISHING
PA 100 OPEN #1,4,0,"K:"
UH 110 XRES=319:YRES=191
NJ 120 FOR LOOP=0 TO 1 STEP 0
JB 130 GRAPHICS 8+16
RS 140 SETCOLOR 2,0,0:SETCOLOR 4,0,0:COLO
   R 1
GK 150 SINEAMPLITUDE=(RND(9)*70)+10
RZ 160 COSINEAMPLITUDE=(RND(9)*70)+10
LU 170 SINEPERIOD=(RND(9)*70)+5
CP 180 COSINEPERIOD=(RND(9)*70)+5
OQ 190 SIZE=(RND(9)*5)+1
FH 200 FOR XPOINT=0 TO XRES STEP SIZE
XZ 210 SINEY=(SIN(XPOINT/SINEPERIOD)*SINE
   AMPLITUDE)+(YRES/2)
UE 220 COSINEY=(COS(XPOINT/COSINEPERIOD)*
   COSINEAMPLITUDE)+(YRES/2)
LY 230 PLOT XPOINT,SINEY:DRAWTO XRES-XPOI
   NT,COSINEY
MA 240 IF PEEK(764)<>255 THEN XPOINT=XRES

BD 250 NEXT XPOINT
LB 260 GET #1,KEYPRESS
QJ 270 IF CHR$(KEYPRESS)="X" THEN LOOP=2
NJ 280 NEXT LOOP
```

LISTING 2

```
/*    Color Sinewave Program      */
/*    By Patrick Bass             */
/*    (c) 1985, ANTIC PUBLISHING */
#include      "portab.h"
#include      "obdefs.h"
#include      "define.h"
#include      "gemdefs.h"
#include      "osbind.h"

      int     contrl[12], intin[256], ptsin[256], intout[256], ptsout[256];
      int     l_intin[20], l_ptsin[20], l_out[100];
      int     color, max_color, handle, xres, yres;
      int     i, k, iter, loop, times, dummy;
      int     sin_amplitude, cos_amplitude;
      int     sin_period, cos_period, step;
      int     key_state;

      double  number, xpoint;

      extern double     sin(), cos(), random();

main()
{
      appl_init();

      handle=graf_handle(&dummy,&dummy,&dummy,&dummy);

      for(i=0; i<10; i++)
      {
            l_intin[i]=1;
      }
      l_intin[10]=2;

      v_opnvwk(l_intin, &handle, l_out);
      xres=l_out[0];
      yres=l_out[1];
      max_color=l_out[13];
```

```
for( loop=0; loop < 1; loop=loop+0 )
{
      do
      {
            color= Random() & 15;
      }
      while( color < 0 || color > max_color );

      vsl_color( handle, color );

      step=( Random() & 3 )+1;

      do
      {
            sin_amplitude=( Random() & 255 )+10;
      }
      while( sin_amplitude < 30 || sin_amplitude > (yres/2) );

      do
      {
            cos_amplitude=( Random() & 255 )+10;
      }
      while( cos_amplitude < 30 || cos_amplitude > (yres/2) );

      do
      {
            sin_period=( Random() & 127 )+10;
      }
      while( sin_period < 10 || sin_period > 100 );

      do
      {
            cos_period=( Random() & 127 )+10;
      }
      while( cos_period < 10 || cos_period > 100 );

      for(iter=1; iter<xres; iter=iter+step)
      {
            xpoint=iter;

            ptsin[0]=xpoint;
            ptsin[1]=(sin(xpoint/sin_period)*sin_amplitude)+(yres/2);

            ptsin[2]=(xres-xpoint);
            ptsin[3]=(cos(xpoint/cos_period)*cos_amplitude)+(yres/2);

            v_pline( handle, 2, ptsin);

      }

      do
      {
            vq_key_s( handle, &key_state );
      }
      while( key_state == 0 );

      if ( key_state == 8 ) loop=2;
}

v_clsvwk(handle);
appl_exit();
}
```

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FINE SCROLLING WORLD: PART II

Dot-by-dot screen moves, 8 times smoother!

by MARK ANDREWS

The conclusion of a two-part tutorial on assembly language scrolling, by the author of ***Atari Roots.*** *You'll learn how to program screens that scroll with professional smoothness, by controlling the Atari's scrolling registers and vertical blank interrupt vectors. The demonstration program is written in assembly language and requires either the MAC/65 assembler (O.S.S.) or the Atari Assembler Editor. It will run on all Atari 8-bit computers, with disk or cassette. This series is intended for programmers with at least an introductory knowledge of assembly language.*

The reason fine scrolling works so smoothly is that it has eight times the resolution of coarse scrolling. When coarse scrolling is used in a program, it causes lines of text to jump across the screen (or up and down) one full character at a time. But when fine scrolling is used, text can be moved around the screen one eighth of a character at a time. Here's how that works.

Look closely at a text character on your video screen, and you'll see that it's made up of a matrix of tiny dots. If you had a magnifying glass, you'd be able to see that there are 64 dots in each character—eight rows of dots (or scan lines) high, and eight rows of dots (or color clocks) across. And these rows of dots—scan lines and color clocks—are the increments used in fine scrolling.

To create and implement a fine scrolling routine, several steps are required. First, you must go to your display list and enable fine scrolling by setting certain bits in the LMS instruction that appears before every line you want to scroll. When bit 4 of an LMS instruction is set, the line that follows the LMS instruction can be scrolled horizontally. When bit 5 of an LMS instruction is set, the line that follows the LMS instruction can be scrolled vertically. If both bit 4 and bit 5 of an LMS instruction are set, the line that follows the instruction can be scrolled both horizontally and vertically.

TYPING IT IN

Type in Listing 1. If you've got the listing from last month's scrolling demo, you can edit and expand it to create this month's listing. Those with MAC/65 can use the listing as is. Atari Assembler Editor owners should substitute the alternate lines in Listing 2.

Antic Disk subscribers will find the MAC/65 source code under the filename FINESCRL. M65, and the object code as FINESCRL. EXE. If you have the Atari Assembler Editor, you must type in the alternate lines from Listing 2. To run the object code from DOS 2, type [L] [RETURN] FINESCRL.EXE [RETURN].

ENABLING

Take a look at lines 340 through 390 in the program you just typed, and you'll see that the LMS instruction preceding the line which I've labeled SCROLN (the line that scrolls) is $57. Most LMS instructions, as we have seen, begin with the digit 4. Why, then, does this one begin with the digit 5?

The number $47, expressed in binary notation, is 0100 0111. Bit 4 of that binary number is a zero and, therefore, not set. This means horizontal fine scrolling is not enabled. If you set bit 4, the number becomes 0101 0111 (or $57) and horizontal fine scrolling is enabled. And that's why the last byte in line 380 of Listing 1 is $57.

Now suppose you wanted to scroll SCRLN vertically instead of horizontally. What would you do? Well, you'd simply set bit 5 of the LMS instruction in line 380. Then the $57 that ends that line would become $67—or in binary notation, 0110 0111. If you wanted to enable both horizontal and vertical scrolling of the line, you'd simply change the last value in line 380 to $77 (0111 0111).

Fine scrolling, like coarse scrolling, can be performed on any number of lines of text on your screen. Just set

the appropriate bits in the proper LMS instructions, and the desired type of scrolling can be implemented for each selected line.

But what if a display list contains no LMS instruction for a line you want to scroll? Well, in that case, you could simply write one. There's no reason a display list can't have an LMS instruction for every line on the screen. In fact, when an entire screen is to be scrolled, a separate LMS instruction must be used for each line that appears on the screen.

IMPLEMENTATION

So far, all we've talked about is how to enable fine scrolling. But once fine scrolling has been enabled, how is it implemented?

When fine scrolling of a line is enabled, control of the line is handed over to one of two *scrolling registers* that reside in your Atari's operating system. If you have authorized a horizontal scroll on a given line of a display, then that line becomes subject to the control of a *horizontal scroll register*, which is abbreviated HSCROL and is at memory address $D404.

When a vertical scroll has been enabled for a given display-list line, that line becomes subject to the control of a *vertical scroll register*, or VSCROL, at address $D405. If both horizontal and vertical scrolling of a given line are enabled, then that line becomes subject to the control of both the HSCROL and the VSCROL registers.

After control of a line has been turned over to HSCROL, VSCROL, or both, you can implement fine scrolls by loading a value into the appropriate scrolling registers. When you load a number into the HSCROL register, every display list line that has been put under the control of that register will be shifted to the right by the number of color clocks loaded into HSCROL. Load a number into the VSCROL register, and every line for which a vertical scroll has been enabled will be scrolled upward by the number of scan lines you have specified.

If both horizontal and vertical scrolling of a given line are enabled, you can move that line left, right, up or down by loading appropriate values into both HSCROL and VSCROL.

COMBINATIONS

There is one hitch, though. The scrolling registers are eight bits, and only four of the eight bits in each register are used. That means that fine scrolling can be taken only so far. To work properly, fine scrolling must be combined with coarse scrolling.

The best way to combine fine and coarse scrolling is to fine scroll a line or column of characters by seven color clocks or scan lines, and then reset the appropriate fine scrolling register to its initial value and implement one coarse scroll. Loop through this kind of procedure over and over, and the result will be a smooth fine scroll. You can see how this procedure works by studying and experimenting with Listing 1.

PERFECT SCROLLING

That's all there is to fine scrolling — if you don't mind putting up with a jerk, a jump or a smear every now and then on your screen. But if these kinds of messy situations don't appeal to you . . . Well, we've come this far — we might as well go on and talk about how to make fine scrolling perfect.

As you may know, your computer's screen display is redrawn by an electron gun 60 times every second. Between each of these screen refresh cycles, there's a split-second total screen blackout that takes place too rapidly for you to see.

So when you write a fine scrolling routine without taking special precautions, some of the scrolling action that you've programmed may take place while your display is actually being drawn on your screen. And this will usually result in unsightly jerks and smears.

Fortunately there is a way to keep this from happening. The folks who designed your Atari have provided something called a vertical blank interrupt (VBI) vector. Learn how to use that vector, and you can perform all kinds of graphics tricks in real time without messing up your display.

A vector is a pointer in your computer's operating system that contains the address of a specific routine. The main purpose of a vector is to offer an easy method for implementing often-used routines. When you jump to an OS vector during the course of a program, your program will automatically jump to the OS routine that the vector points to, and you can thus implement that routine without having to rewrite all of the code that it contains.

Vectors can sometimes be used in another way. Sometimes you can "steal" a vector. That is, you can change its value so that it points to a routine you've written yourself, rather than the OS routine it originally pointed to.

This allows you to use a vector as an easy method for controlling the behavior of your computer's operating system. Listing 1 contains one shamelessly stolen vector—a vertical blank interrupt vector called VVBLKI which is accessed via a pointer at address $0222. (NOTE: There are actually two vertical blank vectors—immediate and deferred. For the purposes of this article we will only deal with the immediate vertical blank vector.)

continued next page

assembly language

VBI VECTORS

Here's how the VVBLKI vector works. Every time your Atari starts a vertical blank interrupt, it takes a look at the contents of the VVBLKI pointer. If the program being processed does not make use of the VVBLKI pointer, that pointer will contain nothing but an instruction to jump to a predetermined memory address: specifically, memory location $E45F (SYSVBV). And memory location $E45F usually contains nothing but an instruction for your computer to continue its normal processing.

By stealing the VVBLKI vector, however, you can make it point to any routine you like—usually one you yourself have written. Then, 60 times every second, your computer will automatically process the routine whose address you have stored in the VVBLKI pointer. When your routine is finished, your computer will resume its normal processing.

Once you understand how the VVBLKI interrupt works, it isn't difficult to steal them. Here's all you have to do:

1. Write a short routine you would like to carry out during a vertical blank interrupt.

2. Make sure that your routine ends with a jump to SYSVBV.

3. Store the address of your routine at VVBLKI.

After these steps are taken, your computer will process your new routine 60 times every second—just *before* it begins each VBI interrupt.

ONE MORE THING . . .

There's just one more important fact that you should remember about VBI vector-stealing. After you've stolen a vector, there's a small chance that an interrupt will begin after the first byte of the pointer that you're using has been updated, but before the second byte has been changed. If that happens, it could crash your program. But this possibility can be avoided by using a routine called SETVBV which begins at memory address $E45C.

To use the SETVBV routine, first load the 6502 Y register with the low byte of the address of the routine that instructs your computer to begin a vector-changing routine. Then load the x register with the high byte of the address. Next, load the accumulator with a 6—a number which Atari computers recognize as a code for VVBLKI routines. Then do a JSR SETVBV, and your interrupt will be safely enabled.

In Listing 1, the VVBLKI vector is stolen in lines 830 through 860. The thievery committed in those lines is quite straightforward. The address of the SCROLL routine at line 910 is slipped into the VVBLKI vector, and from then on, the Atari that is running Listing 1 will automatically call the SCROLL routine 60 times per second, thinking the routine is part of its own operating system.

*Mark Andrews wrote **Atari Roots**, probably the finest introduction to Atari assembly language. It has sold out, but hopefully will be back in print fairly soon. **Antic** published excerpts from this book in November and December 1984.*

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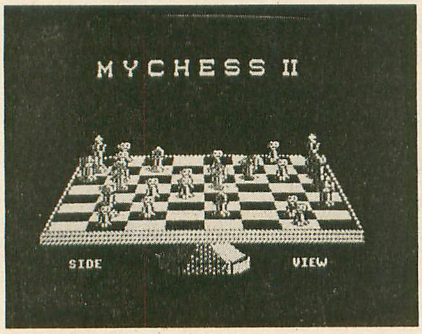
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Reviewed by Scott Lewis

Mychess II, originally developed for computers running the CP/M operating system, is the latest chess program to be converted for the Atari. Mychess II plays a good to very good game, and at $29.95 is quite a bargain. The lowest three skill levels will not prove too difficult for anyone who has played much in amateur tournaments. But at the six higher levels it becomes quite a challenge.

Mychess II has several features not commonly found on chess programs. For example, the back side of the disk contains 128 all-time classic games including Napoleon v. Bertrand, 1820 and Alekhine v. Forrester, 1923.

All the usual features are provided, including game storage, retrieval and replay, hints, notation and diagram displays and instant printout. A clear



and precise Help screen is always available.

The game screen can be toggled between a standard view-from-above and a unique 3-D display. Unfortunately, the 3-D representation is cluttered and unclear. In fact, the graphics throughout this program are not especially good. The kings and queens are hard to tell apart and the color contrast between the two opposing sides is equally confusing.

Other minor problems were that the instruction book cracked and lost 10 pages when I first opened it, and the disk label has already detached itself. But overall, Mychess II is quite a good chess program and well worth the price.

CRUSADE IN EUROPE

by Sid Meier and Ed Bever, Ph.D.
MicroProse Software
120 Lakefront Drive
Hunt Valley, MD 21030
$39.95, 48K disk

Reviewed by Rich Moore

Crusade in Europe is a superb theater-level simulation of the campaign to liberate France during World War II. Authors Sid Meier and Ed Bever of MicroProse have done an excellent job keeping the player's wargaming role consistent with the functions of an actual campaign commander.

The game opens up with a "Patton"-like graphic/sound introduction that can be cut short by pressing [START]. Either a joystick or the keyboard can be used to select options, obtain information and give orders.

The five main scenarios have a total of 14 variants:

Battle for Normandy	(5 variants)
Race for the Rhine	(2 variants)
Operation Market-Garden	(2 variants)
Battle of the Bulge	(4 variants)
Battle for France	(1 variant)

You can play against a human opponent or the computer, choose the level of intelligence data about enemy forces, set handicaps and game speed, save the game in standard DOS files and even change parameters during the game.

The detailed hi-res map scrolls horizontally and vertically through three screens showing England, France, Belgium, Holland and Germany. The map is light during daylight hours and dark at night.

Both commanders have a variety of infantry, armor and headquarters units as well as supply depots. Additionally, the Allied commander has four air wings, and in some scenarios, paratroops.

The German commander has powerful SS Panzer tank divisions backing up his main forces. The starting force lay-down is historical, and reinforcements and replacements follow their historical schedules.

Play is *continuous*. If you don't act, the computer will! Also, any uncompleted orders in effect by either player will continue until the objective is obtained. Action may be frozen at any time—an often-used function when a week's activity can be simulated in an hour!

Forces may be given any of four action commands: Move, Attack, Defend or Reserve. Each of these commands may be given an objective. The unit will move to the designated point on the map, send its commander an "arrival message" and then attack, dig in, or wait for orders.

The units all have some "artificial intelligence" to simulate reasonable action on the part of subordinate commanders. Forces will advance to press successful attacks, or dig in and defend against superior forces. They will also beat strategic retreats to fight another day—if they can reach a safe area before getting wiped out.

The manual would be somewhat intimidating to a beginning wargamer, but it is very thorough and includes a great deal of historical background (read "hints") for all of the scenarios.

I'd recommend getting used to the game by playing the "Liberation of Paris" variant of the Normandy

scenario. This gives you plenty of time and some good historical "benchmarks" to gauge your progress. To get the most practice, set up the game for two human players so you can control all the action!

Crusade in Europe belongs in every wargamer's collection. Adventurers who like graphic role-playing games such as Ultima III would probably enjoy this too. If the other MicroProse "Command Series" wargames are this good, the company has a real string of winners. Now if they'd move the battle to sea. . . .*

*(*If the sea battle request in the last line of this review puzzles you, we'll explain about our new reviewer Rich Moore, an Atari programmer since 1980. In his professional life, he is Lieutenant Commander Richard Moore, Computer Simulation Model Manager for the Wargaming Department of the U.S. Naval War College. He also has over 1900 hours flying F-4 and F-14 jet fighters, plus a masters degree in operations research. **Antic** welcomes Commander Moore aboard.*—ANTIC ED)

MORE BASIC BETTING

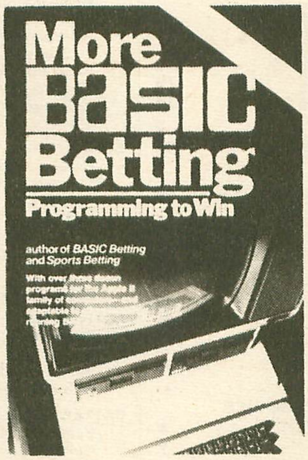
by James Jasper
St. Martin's Press
175 Fifth Avenue
New York, NY 10010
227 pages, paperbound
$12.95

Reviewed by Nat Friedland

Chicago market research programmer James Jasper is a lifelong sports bettor who's written three popular books of type-in handicapping software. His first book came out before the microcomputer was widely available, and the author was forced to rely on calculator formulas.

Now Jasper's latest, **More BASIC Betting**, includes "programming to win" for professional football, baseball and basketball, plus horseracing. There's also a sensible money management progam for bettors.

All the programs are written in Apple II BASIC. The book also provides a mail-order source of program disks at the hefty price of $119.95—and you'll still have to enter all the statistical data.



However, **Antic's** technical staff does agree with the author's claim that any Atari owner with a moderate knowledge of BASIC should easily be able to adapt these programs.

Between the programs are narrative chapters where the author raffishly, entertainingly and rather convincingly tells you about his wins or losses while betting with the programs.

When Jasper details his bets for the first two weeks of the 1984 baseball season, he claims a 13% profit. He says that his latest NFL football "sociogram" program has a 63% overall winning record.

He claims his basketball program never dropped below 59% accuracy and has gone as high as 66% per NBA season. He says that his horse racing program has consistently delivered 12% profits.

So is all this true? Obviously anybody who buys a betting program book is mainly concerned with winning money consistently.

The problem with reviewing this kind of a book is that you really cannot verify the accuracy of the claims without typing in a great deal of sports statistical data and testing out the program for months.

Since we don't have the manpower to go through all of that, this magazine makes no guarantee how successful the programs will be for you.

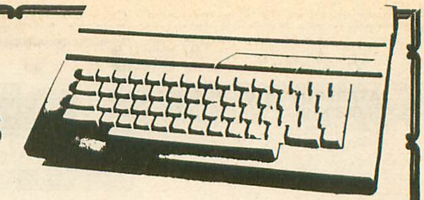
All we can say is that James Jasper writes about sports betting quite believably and his program algorithms seem to make good sense.

For example, his horse racing and dog racing programs convert standard racing form information into an overall formula of "predicted beaten lengths" which is then automatically translated into betting odds.

If you do use this book to get computer help during the coming football season, please send **Antic** a letter or email telling us how you made out.

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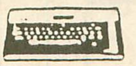
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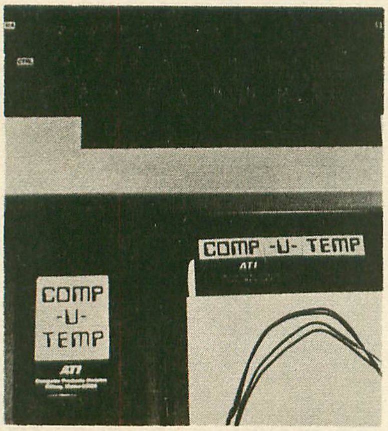
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new products

GENIE

(software)
New Horizons Software
P.O. Box 180253
Austin, TX 78718
(512) 280-0319
$29.95, 48K disk

Genie is a unique new product for the Atari that allows you to temporarily suspend whatever you are doing and access four extra functions. When you are finished, the program returns you to exactly where you left off. The four functions are: Genie Note Pad, a 150 line scratch pad for your sudden inspirations; Genie Calculator, a five function decimal/hexadecimal calculator with a memory; ATASCII Table, a handy reference for those graphic characters you sometimes forget; and DOS Functions, providing instant DOS access. Genie does not use up memory space, and it automatically saves the contents of the Calculator and the Notepad.



COMP-U-TEMP

(temperature sensor)
Applied Technologies, Inc.
Computer Products Division
Lyndon Way
Kittery, ME 03904
(207) 439-5074
$109.95, 48K disk

A new breakthrough in low-cost data logging and temperature monitoring, this package gives your Atari a real-world interface. **Compu-U-Temp** combines the following features: labelling of sensor locations, high temperature or low temperature alarm settings, hardcopy printouts, sampling of temperature at different time intervals and recording of temperature data to disk. Ideal for laboratories, greenhouses and school science projects.

New Products notices are compiled by the **Antic** staff from information provided by the products' manufacturers. Antic welcomes such submissions, but assumes no responsibility for the accuracy of these notices or the performance of the products listed.

MINDWHEEL

(software)
Synapse & Broderbund
17 Paul Drive
San Rafael, CA 94903
(415) 479-1170
$39.95, 48K, Two disk drives

An ambitious and long-awaited series of interactive text adventure games called "Electronic Novels." You'll go into the heart of fictional worlds. Complex interaction is made possible by a sophisticated parser and random events. Instead of puzzles, you are presented with something much more like a story. **Mindwheel** is the first of the series to be released for the Atari. It is a journey into the minds of four people of extrordinary power, all linked to a common neuro-electronic matrix. The next novel will be **Essex**, an intergalactic search-and-rescue mission.

BASIC XE

(software)
Optimized Systems Software
1221B Kentwood Avenue
San Jose, CA 95129
(408) 446-3099
$79, 48K cartridge and disk

BASIC XE is the first programming language designed especially for the 128K memory of the new Atari 130XE computer. But it will also work with XL models. Features a host of new commands and is upwardly compatible to BASIC XL and Atari BASIC. Claimed to be 2 to 6 times faster than Atari BASIC. Provides auto line numbering, renumbering, program cross referencing, English error messages.



COMPETITION PRO MODEL 3000, 5000 & 200X

(joysticks)
Competition Pro
2609 Greenleaf Avenue
Elk Grove, IL 60007
(312) 228-1810
$15.95, $17.95 & $8.95 respectively

Three new models from one of the best-known joystick manufacturers. Each stick features a different control mechanism. The **Model 5000**, designed to bring "arcade feel" to the Atari, features a microswitch assembly for greater accuracy and higher scores. The **Model 3000** "flight control joystick" (pictured) has both top and trigger fire buttons and uses 8-way leaf-switches for precise directional control. The **200X** joystick uses a highly reliable spring switch mechanism and features a handle especially designed for comfort during long hours in front of the screen. All three come with an extra-long five foot cord and are covered by an unconditional two-year warranty.

Return the favor. When you call a manufacturer or supplier about a product you've seen advertised or otherwise mentioned in ANTIC, please tell them so. This will help us to continue to bring you the latest information about products that will make your Atari computer an even more valuable investment in the future. —ANTIC ED

BASIC XE™ Gives Your Atari 130XE™ All The Performance It Should Have Had In The First Place



In the home computer races, the Atari 130XE stands out as a price leader. But using underpowered Atari BASIC™ on this otherwise fine machine is like racing in the Indy 500 with half your cylinders missing.

So don't get left at the starting line with only half an "engine." Change to the performance leader **now!** Buy BASIC XE from OSS, the **only** programming language designed especially for the Atari 130XE.

Just look at what you get for one low sticker price:

BEST MILEAGE: With over 60,000 **more** bytes for your programs, BASIC XE lets you use all the memory you paid for.*

MORE HORSEPOWER: Run Atari BASIC programs 2 to 6 times faster.* Even with its incredible power, BASIC XE is compatible with Atari BASIC.

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FREE ACCESSORIES: Get over $100 worth of Atari BASIC options FREE when you buy BASIC XE: complete Player/Missile Graphics support, string arrays, DOS access, SORT commands, readable listings...over 50 extras at no additional charge.

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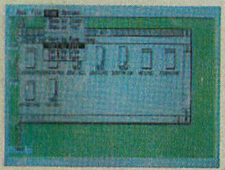
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and good old
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*Sam Tramiel,
President,
ATARI CORP.*

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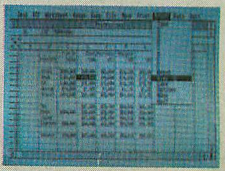
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